This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

THE

ORCHARD HOUSE

BY

THOMAS RIVERS.

3/6

THE CULTIVATION OF FRUIT-TREES

UNDER GLASS.

LONDON
PRINTED BY SPOTTISWOODE AND CO.
NEW-STREET SQUARE

THE

ORCHARD-HOUSE

OR THE

CULTIVATION OF FRUIT-TREES UNDER GLASS.

BY

THOMAS RIVERS.

TWELFTH EDITION, ENLARGED AND IMPROVED.

LONDON:
LONGMANS, GREEN, AND CO.
1865.

191. k. 13.

BIBLIOTHECA·BODLEIANA·
DOMI NUS ILLU MINA TIO MEA

PREFACE

TO

THE TWELFTH EDITION.

EXPERIENCE in orchard-house culture still continues to teach me; and, in giving this Twelfth Edition of my little book to the horticultural world, I have endeavoured to tell all I have learnt since the last was published. There are, as a matter of course, still doubters as to the feasibility of cultivating fruit-trees under glass after the methods given in the following pages: such persons are difficult to move—let them doubt on in peace and quietness. I feel that I am now a central authority in all matters appertaining to orchard-houses; it is therefore with pleasure I state the fact that more structures under that name have been built within the last year than at any former period. I may also add that no method of cultivating fruit-trees has ever been so popular. Since the last edition was published I have gathered, and in the following pages have given, some *fresh* ideas (I begin to believe there is nothing *new* under the sun in gardening), among which the laying out of large houses, portable orchard-houses, the culture of standard peach and nectarine trees in borders with a solid surface (a matter of vital importance), improved culture of apricots by giving them more air, feeding trees from above, how to force by root-heat, how to form an orange-grove, are suggestions which will, I think, be found interesting to amateurs of gardening. The Vineyard under Glass also deserves attention from all dwellers in the southern and eastern counties.

I have thought it necessary to extend my directions for cultivating the Tangierine orange, one of the most delicious of our autumnal fruits. I have in like manner suggested the extension of orange-culture so as to include the Maltese Blood and the thin-rinded St. Michael's Orange, which require the same treatment as the Tangierine, and of the latter of which I have imported young trees of the true sort from the island. I feel a firm conviction that orange-tree houses for the production of fruit only, and not as formerly, for their cultivation as ornamental trees and shrubs, will ere long be in every good garden.

For pear culture under glass I have given some further directions; this is still in its infancy. It will ultimately be carried to a great extent, when the management of the trees is better understood by gardeners. Apples, also, grafted on the English Paradise stock, are much more worthy of attention as orchard-house trees than they were at first thought to be. Apples grafted on this stock are so very dwarf and prolific, and form such charming little bushes, that they will ultimately be most popular.

In the management of apricot-trees in orchard-houses, it will be seen that, writing from recent experience, I have directed syringing the trees to be nearly or quite discontinued. I have also made some change in the mode of summer pinching, which will be found advantageous. I have, in fact, given all the fruits of my experience up to the time of publication.

August 1865.

PREFACE

TO

THE FIRST EDITION.

IT has been, and is, too often the custom of writers on horticulture and agriculture, to write first and practise afterwards—in other words, to promulgate a pretty theory and then reduce it to practice. I have not been 'to this manner given,' for in this instance, as well as in others, I have reduced my practice to writing. The method of culture given in the following pages has been to me a pleasant relaxation from the cares of an extensive business, and I feel convinced that it may be made equally agreeable to a numerous class of busy men, who make their gardens a source of untiring quiet enjoyment.

It is very probable that some who may be tempted to read the following pages will feel surprised that I have made a separate publication on so trifling a subject, when so many horticultural periodicals are open to those who cannot write a large book. They may say, 'Why not occupy a few columns in the "Gardener's Chronicle," or a few pages in the "Cottage Gardener?"' My motive must be my apology.

For many years our parish church, from causes not proper to be mentioned here, was in a fearfully dilapidated state: a partial repair has rescued it from serious consequences; still, much more is required. A hint from one warmly and actively interested in its restoration has induced me to dedicate the profits resulting from the first edition of this little publication towards such a sacred and, I trust, praiseworthy object. I hope not to be misunderstood. It is not ostentation that has tempted me to this; no love of fame, but purely the wish to disseminate a taste for refined horticultural pursuits, and a hope that I, an humble agent, may be, through this, enabled to contribute a trifle towards the restoration of the Church of my forefathers, and, I trust, of my children's children.

December 1850.

CONTENTS.

	PAGE
THE LEAN-TO ORCHARD-HOUSE	5
THE SMALL SPAN-ROOFED ORCHARD-HOUSE	15
THE LARGE SPAN-ROOFED ORCHARD-HOUSE	22
ORCHARD-HOUSES AS SANATORIUMS	35
PORTABLE ORCHARD-HOUSES	38
GENERAL CULTURE	39
Apricots	51
as Pyramids	66
Peaches and Nectarines	69
as Pyramids	84
Miniature Trees	91
Plums	96
Cherries	103
Figs	107
Pears	110
Grapes	116
Vines in Pots on Hot-Water Pipes	121
Vineyard under Glass	124
Apples	128
Mulberries	130
Strawberries	130
Almonds	134
THE FORCING ORCHARD-HOUSE	135
THE HEDGE ORCHARD-HOUSE	143

PAGE
THE TROPICAL ORCHARD-HOUSE 145
HOW TO FORM AN ORANGE-GROVE . . . 164
INSECTS, AND HOW TO DESTROY THEM . . . 167
MONTHLY CALENDAR FOR THE MANAGEMENT OF THE ORCHARD-HOUSE THROUGHOUT THE YEAR . . 171
CONCLUSION 180

APPENDIX.

I. Brick Arnott Stove 181
II. The Arnott Stove Boiler 184
III. The Rationale of Orchard-House Culture . . 186
IV. The Orchard-House of Thomas Bewley, Esq., at Blackrock, Dublin 193
V. The Orchard-House of Dr. Samuel Newington, at Ticehurst, Sussex 196
VI. Compotes 198
VII. Select List of Fruits adapted for Orchard-House Culture 200
INDEX 205

THE

ORCHARD-HOUSE.

It was, I think, in the year 1849, that being very fond of figs, I attempted to grow them in pots in one of my vineries; but, finding they required more room than I could spare, I sought for some method by which I could overcome the difficulty. The pots I used, I should state, were not placed on benches, but on raised borders, for I had adopted the sunken paths and raised borders for many years, to avoid the expense of the usual benches of wood. The roots made their way through the aperture at the bottom, and the plants thus, even in comparatively small pots, obtained enough of vigour to support a crop of fruit. After the crop was gathered, the pots were gently turned on one side, and the roots cut off with a knife; water was withheld, and the plants were soon at rest with well-ripened shoots. The following spring they were top-dressed with manure, and again placed on the border. But an idea occurred to me to give more room for the emission of roots by enlarging the aperture at the bottom of the pots: this I at once put in practice, with the most favourable results. I then reasoned, if figs in pots can be made to bear a crop of fruit by thus giving them extra nourishment during the summer, why should not peaches, nectarines, apricots, vines, plums, cherries, and pears be managed in the same way? They can be so managed; and I have now much pleasure in giving the simple method by which all these choice fruits may be grown on trees in pots, with a certainty of a crop every season; and I hope to see the day when hundreds and thousands of our small gardens will be furnished with cheap fruit-tree houses.

Glass, timber, and bricks are now comparatively cheap. Sheet-glass, which when first brought into notice cost 2*s.* per foot, can now be bought at 2*d.* per foot; so we can build cheap houses, which, without the assistance of artificial heat, will give us, in average seasons, the climate of the south-west of France, without the liability to injury from spring frosts, from which the plants of all temperate climates, both in Europe and America, at times suffer so severely. Let us now see how nearly glass structures without fire-heat will approximate to the climate of France in one of its most temperate districts, viz. Angers.

The Chasselas de Fontainebleau grape, our Royal Muscadine, ripens there in the open air, in average seasons, on August 25: this is as nearly as possible the time when it ripens here under glass without artificial heat. The Black Hamburg grape ripens at Angers on September 25: in one of my vineries, in a warm situation, I have had them fully ripe on the 15th without fire-heat, the berries large, and their flavour exquisite. We can thus, at a little expense, in our own dear native land, reap the benefits of a warm climate, and enjoy its choice fruits, without suffering from its oppressive heat.

I may here mention, that my idea of the approximation of the climate of the orchard-house to that of the south-west of France is not imaginary; for some of my gardening friends from that region have said, on entering it, 'Ah! Monsieur Rivers, voilà notre climat!'

An orchard-house in the south of England will give, as nearly as possible, the summer climate of Toulouse, where peaches, nectarines, apricots, and grapes ripen on standards and dwarfs, in orchards and gardens, in the open air, in great perfection.

I believe that I have more than once described my 'glass-roofed shed,' for I have not ventured to give it too high-sounding a name: still, as it must come into extensive use, a better name may be found expressive of this peculiar structure, which is not a vinery, or pinery, or peach-house

—these all belong to great gardens—but a place for many fruits; it may therefore, I think, without affectation, be called an Orchard-House—a place requiring but little expense to erect, but little experience and attention to manage, and yet giving most agreeable results. To the suburban gardener, who has but a small garden, which must be a *multum in parvo*—to the amateur, with plenty of gardening taste and but a limited income—in short, to a numerous class fully capable of enjoying horticultural pleasures, but with purses not bountifully supplied, the orchard-house will, I feel assured, be a most agreeable boon. I shall therefore proceed to give such directions as will, I trust, enable any carpenter to build one. There are two descriptions of houses calculated for this mode of fruit-culture—the lean-to, and the span-roofed. I shall commence with the former, which is perhaps the cheapest and most simple of garden structures. It is indeed the poor man's orchard-house; for with a few shillings, and skill and industry, a small house may be built by the cottager, some apricots and peaches grown, and sold to his well-to-do neighbours, and his resources added to by a pleasant occupation.

THE LEAN-TO ORCHARD-HOUSE.

Its length may be from ten feet to one hundred or more, according to means and space; but its breadth and height should be according to the following dimensions, unless any improved plan may be suggested which will insure greater advantages at the same cost:—

I will suppose that an orchard-house 30 feet long is required. A ground-plan, 30 feet long and 12 feet 6 inches wide, should be marked out. Then six posts of oak, or good yellow deal, 5 inches by 3, and 10 feet 6 inches in length; or of larch-poles, 16 inches in girth, cut in two, and the flat sides placed outwards, must be firmly fixed two feet in the ground: the ground ends, before fixing, should be charred 2 feet 6 inches from the bottom, and then have a coat of boiling coal-tar, which adds much to their durability. They will form the black line of posts, standing 8 feet 6 inches in height from the surface of the ground. For the front wall six posts of the same thickness, 6 feet 6 inches long, must be firmly fixed 18 inches in the ground, so that they stand five feet out.* Two posts will be required at each end (at one end, if only one door is wanted);

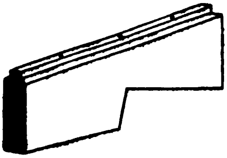
---

* These respective heights of front and back are a matter of choice; they may be increased one foot in both walls.

these will form the door-posts. On these posts, both at front and back, must be nailed a plate, 4 inches by 3, on which the rafters are to rest; the posts are thus arranged in two lines.

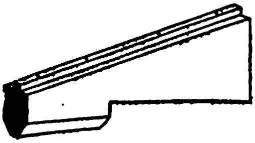
Now then for the rafters. These must be 14 feet long. A 9-inch deal, i.e. a deal 9 inches wide and 3 inches thick, will make four, each 4½ inches by 1½, or nearly so. These are light, strong, and the most economical of all. Instead of 'ploughing' the rebate for the glass (which is great labour and waste of material), on the upper side of each rafter, exactly in the centre, must be nailed a slip of ½-inch board, half an inch wide; this will leave half an inch of the rafter on each side for the glass to rest on (not too much for glass 20 inches in width). The rafters are so far prepared for glazing, but not yet fitted on the plates at top and bottom of the projected house; no mortises must be made, but the rafter fitted to the back plate by cutting out a piece as in fig. 1, and to the front plate as in fig. 2. They must

FIG. 1.



Top end of rafter.

FIG. 2.



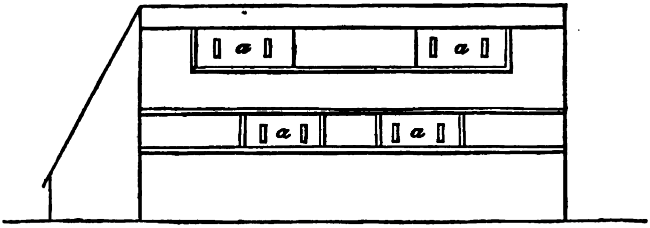
Bottom end of rafter.

then be strongly nailed to the front and back plates, leaving a space between each rebate of 20 inches. A piece of ¾-inch deal-board, 6 inches wide, should be nailed along the top to the end of each rafter, so as to be even with their upper edges, and in this should be a groove to receive the upper ends of the pieces of glass. At the bottom a piece of board, 1 inch thick and 6 inches wide, must be let in, by sawing a piece out of each rafter, for the glass to rest on and to carry off the water. We have thus formed a sloping roof, 8 feet 9 inches (with the plate) high at back, and 5 feet 3 inches high in front.

The glazing is now to be thought of. This is best done by placing a broad plank, 5 or 6 feet long and 2 inches thick, across the rafters, for the glazier to kneel on. Two 'brads' (small headless nails) should be driven into the rafter at the bottom corner of each piece of glass, so as to prevent its slipping down, which, with large pieces of glass, is very apt to occur; a bed of putty should be placed in each rebate for the glass to rest on, and the putty firmly placed over the piece of glass in the usual way when it is fixed in its place. The laps should not exceed a quarter of an inch, and they need not be puttied, as the ventilation is more free when they are not. The most economical glass is 16-ounce British sheet-glass, which can be bought at 2*d.* per foot, and the size to be preferred 20 inches by 12, placing it crosswise, as the rafters should be 20 inches asunder. I find that scarcely any breakage takes place from frost, owing to the large pieces being elastic.

On and outside the back posts ¾-inch well-seasoned deal-boards should be nailed. In the back wall thus formed, sliding shutters in grooves, 3 feet by 1 foot, must be fixed to act as ventilators—two close to the roof, and two 18 inches from the surface of the ground, as in the annexed sketch (the lower shutters in the back wall must always be on a level with the ventilating shutter in front); if two more be added to the right and left of the lower shutters, all the better: *in summer it is impossible to give too much air.*

Fig. 3.



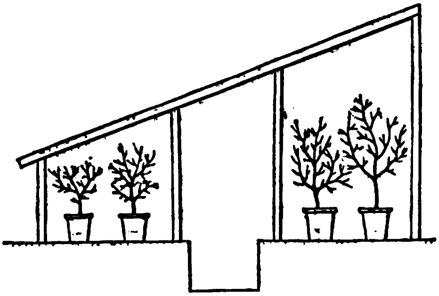
Back of Orchard-House.
a a a a Sliding shutters in grooves.

The front and ends (except the doorway) must also have ¾-inch boards nailed on outside the posts; one of them, the upper one in the front, to be on hinges, so as to let down the whole length of the house: this, with the back shutters, when all are open in hot weather, will ventilate thoroughly. To add to this, and it is all required in summer, the boards will shrink and let in air: a fierce sunlight is thus admitted by the large glass, and abundance of air, in which all fruit-trees thrive to admiration. The boards and rafters should be painted with stone-coloured paint, which will give the house a very neat appearance.

If required, more head-room may be given by making a sunken path 2 feet 6 inches wide, and 6 or 8 inches deep, in the centre of the ground-plan: this will leave a border on each side 4 feet 9 inches wide. The front border need not be raised, as the trees in two or three years will require all the head-room they can have; but the back border should be raised about 18 inches above the surface, and supported by the brick or boarded edge to the path; for the sides of the path must be supported with boards or a 4-inch brick wall. The earth must be kept from the boards forming the back wall by a 4-inch brick wall. It will be found a great improvement (for which I am indebted to a friend) to divide the back border into two terraces by raising the back half 12 or 14 inches, building a 4-inch brick wall, and filling it with earth, so that the back row of trees is elevated, and thus escapes any shade given by the front row; the effect also is very good. Now, as everything depends on these borders—for there must be no benches and no shelves—care must be taken to make their surface loose and open: loose materials, such as lime-rubbish from old walls, and road-sand, mixed with manure, may be laid on them about 4 inches deep; they may then be forked over to about 6 inches in depth, well mixing the above materials with the soil: you thus have two borders, not too far from the glass, and *on* which your orchard will thrive admirably. It will appear odd to read about trees thriving *on* instead of *in* a border; but when I explain that this is to be an orchard in pots, it will not seem so contrary to our usual garden-culture.

It will be seen, I think, by the description I have given, that the lean-to orchard-house is merely a low greenhouse, with its roof sloping to the south or south-west, such as may be seen in many of our small villa-gardens; only, instead of having a path in the centre, and a bench on each side for the flower-pots to stand on, it has a sunken path, and a border of earth on each side,

Fig. 4.



Section of the Lean-to Orchard-House.

on which fruit-trees in pots are to be placed. The preceding rough section (fig. 4) will perhaps convey an idea of this structure and its use.

BUILDER'S ESTIMATE.

By Mr. Burton, Builder, Sawbridgeworth: given in 1857.

To ———. *An Estimate for erecting an Orchard-House,* 30 *feet* 6 *inches long,* 12 *feet* 6 *inches wide,* 3 *feet* 3 *inches high in front, and* 7 *feet* 9 *inches at back.*

3 feet oak door-sill, 4 by 3.
64 feet of fir for plates.
84 feet ditto for end rafters and door-posts, &c., 3½ by 2½.
309 feet ditto for middle rafters and sill, 4½ by 1½.
110 feet ditto for posts, 5 by 3.
30 feet deal for top and bottom rails, 9 by 1¼.
560 feet (super.) ditto for boarding fillets, &c.
90 feet (super.) fir for sides of path, piles, latch, joints, and buttons.
Painting with anticorrosion paint, 2 coats.
187 squares 16-ounce sheet-glass, putty, and labour.

£28 5 0

By using larch-poles instead of square timber for the posts, a saving may be effected; by being one's own carpenter, a large saving. If oak be used for posts, unless small oak-trees can be bought cheaply, 1*l.* 15*s.* must be added to the above estimate.

The foregoing estimate and sketch are for a lean-to orchard-house standing by itself. Where there is a brick or other wall to serve as a back wall, it may be built against it with a great saving in expense; but as sliding shutters cannot conveniently be let into such walls, ventilators may be made at the top of the slope of the roof, by having every alternate square fixed in a wooden frame, which should run in a groove and be drawn up and let down with a cord to which an iron weight should be attached to keep the sliding sash in place: with this the ventilators can be regulated at pleasure. An equally or more convenient mode of ventilating at the top of the sloping roof is by a continuous shutter of wood, in 10-feet lengths, on hinges opening upwards, raised by a line and pulley; this should be 1 foot wide at least. In a house not more than 10 feet wide, this mode of ventilating at front and at the top of the roof will do very well; but in lean-to houses of greater width it is necessary to have shutters in the back wall on a level with those in front, so that two currents of air may meet, and 'stir up' all the air in the house.

The most complete house of this kind, built against an old garden-wall with a SW. aspect, is in this neighbourhood, at Hallingbury Place. The wall is 12 feet high, and covered with full-grown peach and nectarine trees. The house is 200 feet long and 15 feet wide, 4 feet 6 inches high in front; with front sashes, 5 feet by 3, on pivots, and shutters in the back wall, so as to ventilate thoroughly. The rafters are 4½ by 1½ inches, and fixed 20 inches apart; glass 20 inches by 15, and every alternate square at the top next the wall is framed, and on hinges opening upwards (these should be arranged so as to open all at once with a line and pulley). The path in the centre is three feet wide, and on each side, three feet from the path, is a row of espalier peaches and nectarines; between the front row and the glass are bushes in pots, so that in one house are three modes of culture. It is also divided into three seasons by partitions of glass, forming three compartments; two of these are fitted with hot-water pipes, and one left without, as in a common orchard-house. In one house forcing is commenced early, so as to have ripe peaches or other fruit in May; the second succeeds it with peaches in June and July; and the third, without heat, gives its crop in August, September, and October: peaches and nectarines are thus in perfection from the middle or end of May till the end of October.

The fruit on the wall is the first to ripen, and is very early, owing to the warm aspect. This is one of the largest and most agreeable lean-to orchard-houses I have ever seen; and although 15 feet wide, a house like it can be built at a less cost than the narrow upright houses in front of the walls at Trentham, which are only 5 feet in width.

The lean-to house, whether against a wall or standing alone with its boards for walls, forms a most excellent vinery for grapes not requiring fire-heat, such as the Black Hamburg and many other varieties. The vines should be planted inside the front wall and 2½ feet apart, trained under the rafters, 14 inches from the glass, and managed on the spur-system, which is the same as that given for the training of grapes in pots. In the south of England the sort above named will never fail to ripen in this kind of vinery. So much do vines love free air, that I have for some years opened my ventilators in the middle of July, and have never closed them till the middle of September. My grapes have invariably been of the finest quality.

In the north of England, Scotland, and Ireland, where it is necessary to economise sun-heat, and to keep out cold winds, lean-to houses with brick walls must be recommended: they may be built with fixed roofs on the same principles as wooden houses, and will doubtless ripen fruit in cool climates more effectually than houses with boards for walls.

THE
SMALL SPAN-ROOFED ORCHARD-HOUSE.

I NOW give a rough sketch and description of my favourite sort of orchard-house, the span-roofed. In houses of this kind peaches and nectarines do not, perhaps, ripen so early as in lean-to houses, but quite as early as on walls. Owing to their being detached, they can be more thoroughly ventilated, and the fruit from them is generally piquant in flavour.

A situation cannot be too light and airy for these span-roofed houses. I believe that orchard-houses on Epsom Downs would yield the finest peaches in the world; still they are not ineligible even for low and moist situations, where they always give a comparatively dry climate.

In situations near the sea, or in valleys with a very humid air, or in the cool moist climates of many places in the north, a single 4-inch pipe with hot water, to be kept heated all the blooming season, will be found most beneficial, as dry air prevents the pollen being glued to the anthers, and much facilitates the setting of the fruit. In autumn also it would be useful to hasten the ripening process.

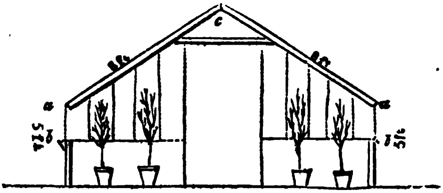
In the Highlands, and in the cold stormy climates of the north of either Scotland or Ireland, it will perhaps be quite necessary to introduce hot-water pipes into houses in which peaches, nectarines, and apricots are to be cultivated, not exactly to force them, but to insure their ripening properly. The shoots of such trees also require a dry and warm atmosphere in the autumn, even after the fruit is gathered, or they will not ripen: and consequently they will not put forth vigorous fruit-giving blossoms.

A small span-roofed house is so simple in its character that any self-taught builder or amateur may erect one. The way to do it is as follows:—Two rows of oak posts, 5 inches by 3, and 7 feet long, should be firmly fixed 2 feet in the ground; 5 feet out, 14 feet row from row, and 5 feet apart in the rows. On each of these rows should be firmly nailed a plate 4 inches by 2, to receive the lower ends of the rafters, which may be nailed on as directed for the lean-to house, p. 6. The rafters should be 8 feet long, and 3 inches by 1½: they can be bought of Mr. Rivett, or at any sawmill, planed and chamfered, for 10*s*. or 12*s*. per 100 feet. The ridge-board *e*, in fig. 6, should be 5 inches by 1, to which the upper ends of the two rows of rafters, after being sloped, should be nailed. As the glass cannot be made to fit on the plate at bottom, a drip-board, 5 inches by 1, placed sloping to receive the lower ends of the pieces of glass, must be fixed on the plate the full length of the house. On the ridge-board a small ledge must be nailed, for the upper ends of the pieces of glass to rest on. On the upper edge of the ridge-board a cap, 3 inches by 1, shaped thus ∧ should be nailed, to shoot off the water and prevent its entrance at the ridge.

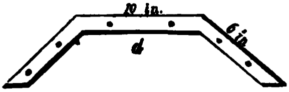
Description of my Small Span-roofed Orchard-House.

Height at sides, 5 feet; height to ridge, 9 feet; width, 14 feet. The roof rests on oak posts, 5 inches by 3 inches,* 5 feet apart (the usual way of building with brick foundations and sills may be employed). It stands north-east and south-

Fig. 5.



Section of the Small Span-roofed Orchard-House.



a a Glass, 18 inches. *b b* Ventilating shutters, 1 foot. *c* Opening over door. *d* Iron tie screwed to every fourth rafter at apex of the roof. *e* Ridge-board.

---

* Oak posts of this size, I find, on referring to the wooden tombs in the churchyards, last from 50 to 60 years. Deal posts let into iron sockets (see p. 38) are preferable to any other mode of building.

west, so that the sun shines all the early part of the day on the south-east side, and in the afternoon on the north-west side.

The rafters are 20 inches apart: it is glazed with 16-ounce glass, in pieces 20 inches by 15 inches, and has a row of glass 18 inches wide (in pieces 20 inches long placed end to end, without putty where they are joined) on each side under the eave-boards. Under the glass also, on each side, is a ventilating shutter of ¾-inch board, 1 foot wide, on hinges opening downwards.* Below and above this are boards (¾-inch), the former to the ground. The two ends are glazed down to the lower edges of the glass at the sides. The rafters are 3 inches by 1½ inch, and are tied together at the apex of the roof by a light flat iron tie screwed to every fourth rafter. Besides these ties, and to prevent the posts going out, oaken spurs are fixed underground to every fourth post on each side. This may seem, in print, a homely structure, for there are no sashes, and the roof is fixed; but it is really light and most cheerful-looking.

Now, as to ventilation. There are no apertures in the roof, for I have long since found my houses perfectly ventilated without them, and the shutters are 1 foot 6 inches (the lower edges) from the ground. In sunny weather the air in the house, from the great quantity of sunlight admitted by the large pieces of glass, becomes soon rarefied; and then the comparatively heavy cool air from without enters below in two continuous currents. This, of course, soon becomes warm and light, and ascends to the apex of the roof rapidly through the leaves and branches of the trees which are placed on, or planted in, each border; for in this description of house the path is two or three feet wide—which may, or may not, be sunk two or three inches, according to choice—is in the centre, and the borders for the trees on each side. It may seem strange that no egress for the heated air should be in the roof, and not quite as it ought to be; but I deal only with the result of much experience, and find that by simply leaving a triangular aperture 9 inches deep close under the gable of the roof, over the doorways at each end, no stagnant air ever exists in my houses. These apertures are closed only on frosty nights in the spring, when the trees are in bloom, by a piece of matting; all the rest of the year they are left open. When the sun shines brightly, the heated air rushes out at each end rapidly enough almost to turn a small windmill; the leaves of the trees are all in motion, and no scorching takes place. This low lateral ventilation is so perfect, that in two large houses, 70 feet long and 20 feet wide, the *only* ventilators are shutters 1 foot wide, on each side, about 2 feet 6 inches from the ground. One of these houses is heated by hot water all the summer for the culture of young vines and figs, yet no scorching ever occurs. I have therefore ceased to think roof-ventilation necessary in houses under 30 feet in width.

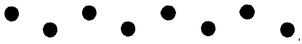
---

* If shutters or sashes on hinges are used as ventilators, they should always open downwards; if suspended over the apertures, they prevent the downward current of air entering.

The great saving effected in doing away with roof-ventilation by the usual sliding sashes will be apparent, if an estimate for building an orchard-house 14 feet wide be procured from any of the regular hothouse builders. I have seen one which was at the rate of 4*l.* 10*s.* per lineal foot, making a house 100 feet long and 14 feet wide cost 450*l.*; while one built as I have described can be well finished for something considerably under 100*l.* I say this advisedly, for I have built one—with my own skilled labourers—of the above dimensions for 50*l.*

This cheapness of construction is entirely owing to the simple way in which ventilation is provided for. The borders in a small span-roofed house need not be raised, nor the path be sunk, except as a matter of choice; the expense of a brick edging is thus saved. The borders should have a dressing of manure and sand, or manure and burnt earth—in short, of any loose materials—and be well forked over and mixed with the dressing to 6 inches in depth.

Two rows of trees may be placed on each border thus *—



3 feet from stem to stem, so that the sun may shine on every leaf. This is most essential; for I have occasionally had some of my peaches deficient in flavour, and on examination have always found the trees too much crowded, so as to shade each other. In these small span-roofed houses, the trees placed as above form a charming avenue, and are looked down upon by the cultivator, so that every leaf and fruit is seen.

A very light and elegant small span-roofed house may be built with sashes 2 feet in depth (from the eave-boards) hung on pivots, and beneath the sashes strong 32-ounce glass to the ground, so that roof and sides and ends are all glass. By having strong glass to the ground, instead of brickwork or boards, some extra expense would be incurred, but the effect would be excellent.

The cost of a plain boarded house, as given me recently by Mr. Rivett, builder, Stratford, Essex, is as follows:—

'A span-roofed orchard-house, 30 feet long, 14 feet wide; sides 5 feet, middle to ridge 9 feet high; oak posts, 5 inches by 3; sides close-

---

* A house 20 feet long and 14 feet wide will hold 24 trees.

boarded, roof glazed with 16-ounce glass, painted twice with anticorrosion paint: complete, 27*l.* 10*s.*

Mr. Dennis, of the Horticultural Works, Chelmsford, has recently built here one of his patent houses with wrought-iron sash-bars—a span-roofed house, 14 feet wide and 20 feet long. This house is one of the strongest, lightest, and most agreeable description of orchard-houses ever invented; and a house 20 or 24 feet wide, built after the same model, would be ornamental as well as useful and agreeable, even in first-class pleasure-grounds. Owing to the expense in working the materials used, the cost of these houses is nearly double that of wooden houses, so that a small span-roofed house like that described, p. 17, which would cost from 21*s.* to 25*s.* per lineal foot, according to its finish, would cost, if built like that which Mr. Dennis has erected here, from 35*s.* to 37*s.* per lineal foot; it is a sort of 'maison de luxe,' and all such erections are more costly than plain structures.

THE
LARGE SPAN-ROOFED ORCHARD-HOUSE.

THE small span-roofed house will be found an agreeable and economic structure; but large gardens require large houses, and for these the following construction may be confidently recommended:—

A cheap, large, span-roofed house, 20 feet wide, and 12 feet in height to the ridge, may be built after the following manner:—Oak posts,* 6 inches by 4, and 7½ feet long, should be placed flatwise, so as to stand 5 feet clear out of the ground, and the soil well rammed round them; or concrete poured in so that they stand firmly. These posts should stand in two rows, 20 feet apart, 5 feet apart in the rows. On them should be nailed the plates, to receive the ends of the rafters, which may be nailed on to them, as recommended for the lean-to house, p. 6. These plates should be 5 inches by 3. The rafters should be 4½ inches by 1½, and nailed to the ridge-board at the apex of the roof, which should be 12 feet from the surface. The ridge-board should be 5 by 1½ inches. The rafters must be prepared for glazing in the manner recommended for the lean-to house, p. 6, and placed 20 inches asunder. The sides and ends of the house should be formed of ¾-inch boards, and, for ventilation, a shutter, 18 inches wide, made into 15-feet lengths and opening on hinges downwards, the lower edge 18 inches from the ground, should be placed on each side: these are for the admission of cool air. For the egress of the heated air, an aperture, 1 foot deep, should be made at each end, just under the apex of the roof. To this a shutter on hinges should be fixed, and this should be kept open from the beginning of June till the end of September. The roof should be supported, and kept from going out, either by light 'collar-beams' of wood to every sixth rafter, by iron rods, so disposed as to tie the roof securely, or, best of all, by two rows of iron pillars, formed of 2-inch gas-pipes, which are very cheap, 6 feet from each side; the lower ends placed in the ground, and let into a small square of brickwork and cement, the upper ends let into a rafter double the size of the others. These pillars should be about 7 feet apart.

---

* Deal posts in cast-iron sockets (see p. 38) answer admirably. Mr. Hughes, Iron Foundry, Bishop's Stortford, does them well.

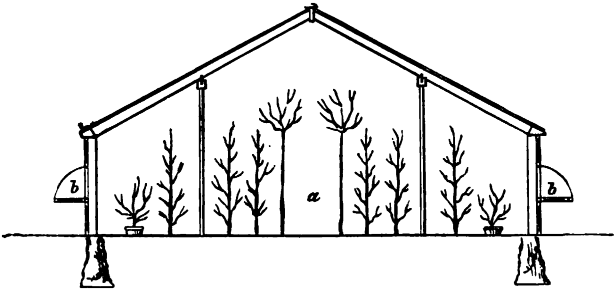
It will be seen from this description that a house built after this method is a plain but useful structure, for its sides, ends, and doors (there should be one at each end, in the centre) are all of boards, and its roof only of glass. Nevertheless, this description of orchard-house will give fruit in as great abundance, and of as fine a flavour, as a house built ornamentally, and at a great expense.

In a large span-roofed house thus built, there need not be any raised brick beds, but merely a nice well-kept gravel-walk down the centre, about 3 feet or more wide, and the trees (if in pots) placed on the borders on each side, or planted in the borders. The most eligible trees for a house of this size are either low standards with stems 5½ feet or so in height, or half-standards, with stems about 3 feet in height, planted about 5 feet apart; and as they increase in size, they may, after three or four years, be arranged so as to stand from 6 to 8 feet apart. If it is thought preferable to plant the trees, and allow them to grow without being subjected to either root-pruning or removal, and to be merely kept in check by summer pinching and winter pruning, they should be planted from 8 to 10 feet apart. The latter mode of planting is adapted to those who cannot or do not wish to devote much time to orchard-house culture. In either case, an orchard of peaches, nectarines, plums, cherries, and a few of the finer sorts of pears and apples, thus planted, under a spacious glass roof, would be found both interesting and profitable.

The following is the estimate given me by Mr. Rivett for a large span-roofed orchard-house, with boards for its sides and ends :—' An orchard-house 30 feet long, 20 feet wide, sides 5 feet high, middle 12 feet to ridge, with iron pillars to support roof, oak posts, sides close-boarded, roof glazed with 16-ounce glass, two coats of anti-corrosion paint given to boards and roof: *45l.*'

I have very recently (June 1860) built a house here, which for strength, cheapness, and lightness of construction, is both eligible and agreeable (see figs. 6 and 7). It differs from the houses which I formerly built and recommended, in having no raised brick borders, by which a considerable

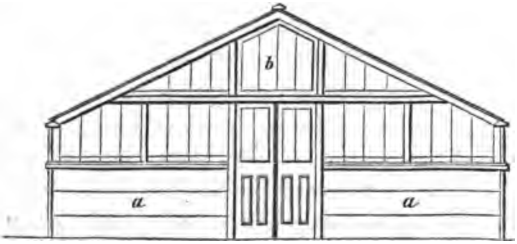
Fig. 6.



Transverse Section of an Orchard-House 24 feet wide.

a Central path. *b b* Shutters for ventilation.

Fig. 7.



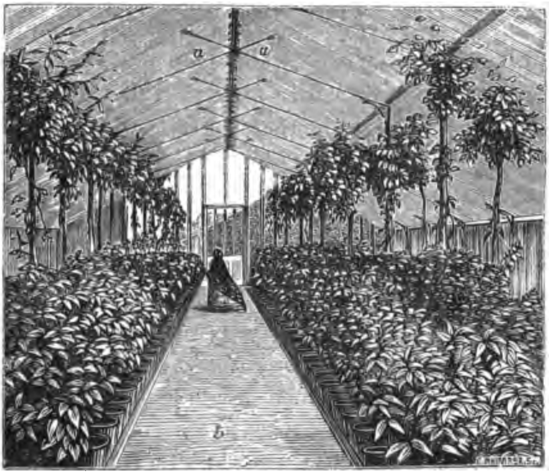
End elevation of an Orchard-House 24 feet wide.

a a Glazed shutters on hinges, opening downwards. *b* Sash for egress of heated air, opening downwards.

saving is effected. No inconvenience will arise from the trees standing on the ground level, for it is only necessary to cultivate the trees as pyramids, or half-standards, for the central border, and as dwarfs with stems a foot taller than usual for the side borders. It is 100 feet long, 24 feet wide, 12 feet high in the centre, and 5 feet 3 inches at the sides. Sides and ends are glass, and on each side and at both ends is a glazed shutter, 18 inches wide, the lower edge 18 inches from the ground, on hinges opening downwards (see fig. 6) for low lateral ventilation, the only perfect mode of ventilating, and below that glass to the ground. At each end, just under the gable of the roof, as in fig. 7, *a*, are openings 3 feet in depth, to which sashes are fixed; these are to be open all the summer, to let off the hot air, and this is all the top ventilation necessary.

The roof, which is formed with light rafters 3½ inches by 1½, is supported on each side by seven light iron pillars, 1½ inch in diameter, fixed to a bar of iron, which is let into the rafters. Each row of pillars is 6 feet from the sides of the house, so that there is a border on each side 6 feet wide, and an area in the centre 12 feet wide. There are two modes of laying out the interior of these large span-roofed houses: one is to have two paths and a bed (not raised) marked out in the centre, 7 feet wide, in the centre of which may be planted a row of standard peaches and nectarines, with stems from 5 to 6 feet in height, about 5 feet apart. After a few years—say from five to seven—when their branches meet, every alternate tree may be removed. These standards should be partially under summer pinching, as recommended for dwarf bushes, p. 76; and thus managed, they will bear large quantities of fruit before there will be any occasion to remove the alternate trees. The remaining space of the central border may be occupied with pyramidal trees or half-standards, with stems from 2½ to 3 feet in height, either in

Fig. 8.



Orchard-House 30 feet wide, 90 feet long, erected for Mr. J. R. Pearson, Chilwell. (From a Photograph.)

a a Iron tie rods. *b* Central path, paved with Minton tiles.

pots (which for pyramids is the best mode of culture), or planted in the border. The two side beds may be occupied with bush-trees in pots.

The other mode of laying out a house, from 20 to 30 feet wide, is to have only one path, and that in the centre, and this may be from 3 to 5 feet wide, according to the width of the house. It may be either of fine binding gravel, which forms a dry warm path, and is perhaps the most 'gardenesque,' or, if expense be of no import, paved with Minton tiles (see fig. 8). On each side of this central walk, and about 2 feet from its edge, may be planted a row of standard peaches and nectarines, of the height described above, at the same distance apart, and subjected to the same treatment as the trees in the single row above described. They will soon form a beautiful avenue, and a house thus planted (see fig. 6) will have a charming effect. The remaining space in the borders on each side the row of standards may be occupied with bush-trees and half-standards, in pots, or planted in the ground at the pleasure of the owner. There is one great source of comfort to the fruit gardener: in a large house an abundant crop is certain, for spring frosts do not penetrate such structures to any injurious extent. If any part of the avenue is formed of standard apricots, they will require more space, and should be planted 8 feet apart. The best variety for this mode of cultivation is the peach apricot, as it is not inclined to make long bare shoots; but even this prolific sort requires to be under rigid summer pinching to make standard trees form compact fruitful heads.

In pruning and summer pinching of standard and half-standard peaches and nectarines planted in the borders of orchard-houses, it is of great consequence to make the trees flat-headed, so as to expose as large a surface as possible to the sun: this is done in the winter pruning, by cutting out closely the upright branches, and in spring and summer by rubbing off ('disbudding') all the young shoots inclined to grow upright—in short, to encourage daily all the summer horizontal growth. Standard peaches treated in this way bear bushels of fruit, and one day will entirely supersede the tiresome trellis system on which gardeners waste so much time in tying and training.

There is one thing most necessary to be adhered to in the culture of standard and half-standard peaches under glass—the ground must not be stirred after they are planted. This idea will, of course, be combated by some gardeners. I can only repeat, let the surface of your house be as solid as a path, and do not listen to those who advise the contrary.

A few words about the preparation of the borders of an orchard-house before planting will, I trust, suffice. Stir the borders with the fork or spade 22 inches in depth; if the soil be poor, some rotten manure may be mixed with it to that depth. It should rest a fortnight to settle before the trees are planted, and as soon as that operation is finished tread all the surface firmly, and do not allow it to be shaded by placing too many trees in pots among the standards. If after a few years, from bearing very heavy crops, the trees become a little exhausted, spread on the surface, in March, some of the rich compost recommended for surface-dressing, to about three-fourths of an inch in thickness, and allow the roots to feed upon it, but do not disturb them.

With mere amateurs it is still an open question whether to plant all the trees required for an orchard-house in the borders, or to cultivate them in pots.

For some few years I have closely watched both modes of culture, and at last feel that I can give a more decided opinion than I have ever yet done. In large span-roofed houses, *i.e.* houses 18 feet wide and upwards, with a central walk and a broad border on each side, half-standard trees, or trees with stems about 3 feet in height; and standards, or trees with stems from 5 to 5½ feet in height, may be planted in the borders with advantage, the only condition required being solidity of soil. A peach-tree would grow and bear better in the centre of a solid path than in the richest, deepest, and most fertile soil of a kitchen-garden, if light and dry. To illustrate this I venture to describe the method followed in the cultivation of some tall standard peaches now growing in one of my large orchard-houses; they are now about seven years old, and are full of health, vigour, and fruit.

The soil on which the house is built is a strong calcareous clay: when the trees were planted this was stirred to the depth of nearly 2 feet, some manure was mixed with it, the trees planted, the earth firmly trodden—and firmly trodden it has remained ever since. The vigour and fertility of the trees is most remarkable, and they stand in a firm unbroken floor. In March they have a slight surface-dressing of the compost described in p. 60—which prevents the water running off—and are abundantly watered. This is repeated during the spring and summer—once a week in hot weather, and once a fortnight in wet cloudy weather—till the last week in October; no more is given till the first week in March. If the surface is particularly smooth and hard, it is slightly pricked, before giving the first water in spring, with the points of a steel fork, so that it will admit it. It is good practice to give some fresh surface-dressing in July, when the fruit is swelling; this absorbs moisture and feeds the roots. From three to four or five gallons of water may be given to each tree in sunny weather in summer. I feel that I ought to mention the vast field of peach and nectarine culture which this method opens up; not only can peach-trees, as at present, be cultivated so as to produce two or three pecks each, but in houses 30 feet wide, 8 feet high at their sides, and 16 feet high in the centre, large umbrageous trees may be grown, and each tree produce as many bushels.

Cultivators of the soil require a long period to shake off the trammels of routine, but I have no hesitation in saying that one day, ere long, peaches will be sold by the peck, not only for the people, but for preserving. Apricots, more particularly the Peach Apricot and the Moor Park, succeed admirably as standard trees planted in borders with a firm surface. My trees, thus cultivated, are this season (1865) breaking down with their load of fruit.

The most perfect method of growing peaches and nectarines in a large span-roofed orchard-house, so as to produce those large peaches one sometimes sees at Marseilles and in other places in the south of France, would be to give the trees root-heat, i.e. to plant them in borders heated by hot-water pipes, placed about 2 feet under the surface, as recommended for the 'orange grove,' p. 164. We have as yet but a glimmering idea of what root-heat will do. I am at this moment reminded of what occurred in the garden of a mansion near Brighton. Two Louise Bonne pyramidal pear-trees happened to be growing in the open air, their roots very near to some hot-water pipes, placed in the ground to heat a vine-border. The pear-trees in the garden, of the same and various other kinds, all blossomed freely in 1861, but none of them bore fruit except the two trees with their roots in a warm place, and they bore a large crop of very fine fruit.

A house 100 feet by 24 would produce enough choice fruit for a very large family, as from 180 to 200 trees in pots could be cultivated in it.* These large span-roofs are far more light and cheap than the ridge and furrow roofs, like those of the great conservatory at Chatsworth and the Crystal Palace. They may be from 24 to 30 feet in width, the roof supported by light iron pillars. The lateral ventilation (see p. 23) will be found quite perfect, only in a house of the last-mentioned width the shutters should be 2 feet instead of 18 inches deep. The great object is to have a light unbroken roof, without ridges, furrows, and gutters, all of which are rather new, or at least not very old, but all clumsy and unpleasing. In houses where expense is not heeded, the water should be conducted from the roof into a tank or tanks underground, either outside or inside. Rainwater is the best of all to syringe or to water the trees with.

---

* In No. 56 of *All the Year Round* for 1860 it is suggested that a few trips to Sawbridgeworth should be made by small market-gardeners and cottagers, 'as it is not enough to *tell* them what *may be* done with orchard-houses: they must be shown what *is* done.' I can only say, that poor and rich, or those neither one nor the other—in short, all who wish to benefit by what they can see and hear, if they will make their way to the Harlow Station, on the Eastern Counties Railway, and then to Rose Hill, between Harlow and Sawbridgeworth—may see houses of all kinds, approaching to forty in number, and have all their questions answered.

It is essential that these large houses should stand endwise NE. and SW., or nearly so; for if placed NW. and SE., as some of mine are, owing to the peculiarity of the site, the trees in the north-east border will be too much shaded, and will not ripen their fruit well. I also prefer the same position for small span-roofed houses. The height of the houses I have described exceeds that which I have given in former editions, but I am inclined to think it more eligible, for it is surprising to see what fine and even large trees can be grown in houses of this size and height.

ORCHARD-HOUSES AS SANATORIUMS.

(*From the 'Quarterly Review' for October* 1859.)

'STRUCTURES like these are as much for ornament and pleasure as for the cultivation of fruit. The dry air of a spacious orchard-house is most agreeable in the autumn, winter, and spring months for invalids. An hour's sunshine sends the air up to 60°. Early spring and winter-blossoming shrubs may be introduced, but not evergreens; for to keep the latter in health they must be liberally watered, and this destroys the elasticity and dryness of the air which makes it so agreeable to breathe. Some plants of *Chimonanthus fragrans*, in large pots, will give their sweet flowers in January. *Jasminum nudiflorum* and the *Forsythias*, although quite leafless when in bloom, have a gay appearance. Banksian roses, Mezereons, the early Dutch honeysuckle, the different varieties of *Magnolia conspicua*, the Moutan pæonies, and many other plants, may be grown in pots, and will bloom freely from January to April, with only a small quantity of water.

'In such dry and sunny counties as Surrey and Hampshire, orchard-house sanatoriums will one day be formed, and a fine dry air will be secured, more healthy and grateful than can be found in Continental Europe—the air of Nice without its cutting winds.'

Since the above was written, I have annually been struck with its truth—so pure and health-giving is the dry air of large orchard-houses. In addition to the shrubs mentioned in the above extract, I have for two or three seasons past introduced large (11-inch) pots planted thickly with spring-flowering bulbs and anemones, which have given a foretaste of spring in February.

I can with truth state that the advantages of large glass-roofed houses as places of resort for active exercise in unfavourable weather, by ladies and persons in delicate health, are not yet half so familiar as they should be.

> Slow, slow are thy ways, O progress!

It may be a wild idea, but I can see no reason why orchard-houses for winter croquet-grounds should not be erected; the turf could be kept always verdant with proper attention to mowing and watering. A house 30 to 35 feet wide, and from 100 to 150 feet in length, would give sufficient space to play the game well, at least as far as ladies are concerned. Muscular young officers might require more room, but they must play in the open air. When sanatoriums and croquet-houses are fully established, people will wonder how they could have existed in England without such places; so dry and health-giving is the air of large glass-roofed houses in autumn, winter, and spring, when no plants requiring heat and moisture are cultivated in them. For my own part, I would submit to walk in a house without a tree or shrub in it, merely for a promenade in bad weather, rather than not have one.

PORTABLE ORCHARD-HOUSES.

In gardens rented by their occupiers, it is still almost an open question if structures of glass, such as green-houses or orchard-houses, if fixed, can be removed by the tenant at the expiration of his agreement or lease, unless it be specially provided for in a document of that description. Hence arises the want of a house that may be removed without any infringement of a landlord's rights. I am informed by my friend, Mr. Pearson, of Chilwell, near Nottingham, that a builder living near him has recently invented a very ingenious portable house. I am not acquainted with his method of building, but I can point out a very simple mode of erecting one. Cast-iron sockets, 4 inches by 3 inside, and 2 feet in length, with 3-inch flanges at the lower end, should be let into the ground, so as to stand 6 inches above the surface, and firmly rammed, or concrete placed round them, to keep them in their places. In these the posts (5 inches by 3) should be fitted, so as to leave a shoulder of ½ an inch on each side to support the posts, which are let into sockets about 1 foot, and are as it were suspended in them as they are left hollow. These posts should be placed with their broadest surface parallel with the house, or flatwise. When thus fitted into the iron sockets, they require no cement to fasten them, but some thick paint—

whitelead and oil, may be placed inside the iron socket, before the post is let into it; this will make it more firm. When a house is to be removed, the posts may be drawn out and the sockets left, so that no ground is broken. The employment of cast-iron sockets, which cost a mere trifle, may be recommended, not only for portable houses, but for those that are intended to stand permanently; for where oak is scarce, fir-timber posts may be employed. They will stand perfectly dry in the sockets, and last as long as the rafters. There is no method of building orchard-houses so simple or so cheap as the employment of neat bevelled posts for the sides; and the above method will be found of great advantage to those who prefer, as a measure of economy, a *home-made house.* It must be recollected that in building a portable span-roofed house, the plates, rafters, &c., should be screwed on so as to be easily unfixed: not a nail should be used.

GENERAL CULTURE.

Many gardeners have asserted that peaches and nectarines from bushes are inferior in flavour to those grown on trellises in peach-houses; and that more fruit could be produced in the same space by the latter mode. I can easily imagine a partial failure in flavour; not owing, however, to the system, but to the management. The trees alluded to have not had room or air enough, and consequently the fruit has not been high-flavoured.

I have had Noblesse and other peaches of the most delicious flavour from bushes in a pot standing in the full sunshine in one of my houses, while those from trees partially shaded were not good. Care should therefore be taken to insulate the trees, so that sunshine and air bathe every fruit and leaf.

The peach-house trellis system is not adapted for small gardens; one tree, or at most two, will cover the roof of a house 20 feet by 12; and nothing can be grown under them. Besides this, three or four years must elapse before they commence to bear to any extent; and, above all, it will require a good gardener to train and prune them, for no amateur could bear the fatigue of constantly keeping his eyes to the sun.

Since the foregoing pages were written, 'crystal palaces' have been built. I have written for more humble gardens; but large orchard-houses may be erected 25 to 30 feet wide, and thoroughly ventilated laterally, so as to give piquant flavour to fruit. One of these large houses, well furnished with peaches, nectarines, apricots, plums, cherries, pears, and figs, and treated as recommended for all other orchard-house trees, would realise an Eastern garden, and bring to mind one of the fruit-gardens of Damascus, so vividly described by travellers. In short, I know of nothing in gardening more capable of fully gratifying the senses of sight and taste. Thus, in large places, in lieu of a cheap and simple orchard-house, a fruit conservatory heated by hot-water pipes may be built, and the trees grown in ornamental vases, placed on elevated beds. A few tea scented and other delicate roses, and spring-flowering bulbs, planted in the borders, would make them gay, and have a pretty effect. It must, however, be recollected, that but very few of what are called conservatory plants can be planted in a common orchard-house; neither can bedding plants be preserved in it, unless the pots are laid down and covered in frosty weather with a painted table-cover and hay; for it is necessary that it should be cold and dry in winter to give the fruit-trees their rest. If fire-heat be used, it must only be applied early in spring, towards the end of February—to force the fruit, if early fruit be required; and not in winter, as in green-houses, to keep out the frost. The most severe frost will not injure tea-scented roses or bulbs, if the house be kept perfectly dry after October.

I have now, however, the great satisfaction of stating that orange and lemon trees and camellias may be grown in pots in any common orchard-house without fire-heat, by the very simple method—and how simple are all good gardening practices!—of taking advantage of earth-heat (terrestrial radiation), which is done by laying the pots on their sides on the earth-borders of the house in November or December, but not till the approach of severe frost, and covering pots and trees with a common painted table-cover, costing about sixpence per yard, and then with a coating, say one foot thick, of dry hay or straw, giving the plants some water before they are laid down.* If the weather should be mild in the winter months, as it often is, the covering, which is easily removed, may be taken off, and replaced as soon as frost approaches, and suffered to remain on even if the frost lasts some weeks. About the first week in March, if the weather be mild, the camellias may be placed upright and have water, as their flower-buds will be swelling; they will then bloom all through April, some of their flower-buds may perhaps drop off, but not to any extent; for the plants will be in a better condition than they often are after being wintered in a green-house exposed to heat, necessary to keep out frost, and consequently to a dry atmosphere.

Towards the end of the month of March, or earlier if the season be mild, the orange and lemon trees may be placed upright, and have water, which should be given sparingly the first fortnight. They will then blossom and bear their fruit in the house all the summer and autumn. If any sudden severe frost should occur in March or early in April, all the trees must be promptly laid down and covered till it has passed. The radiation of heat from the earth is so gentle and constant, that when thus intercepted by a thick dry covering, no fear of injury even from the most severe frost need be apprehended. I write with confidence on this subject, having for many years kept tender evergreens in pots from frost, by merely laying them down on the soil in the open air and covering them with mats. The application of the system to orange-trees in orchard-houses, is, however, a new idea, and was brought to mind by the following incident:—

---

* Towards the end of December 1861, some Tangierine orange-trees and camellias were laid down in one of my large span-roofed houses, on the surface of the central border. These were covered with a piece of the table-covering, and some dry hay placed on it about a foot thick. They remained covered till early in February, or about six weeks; on the covers being removed, they were in the most perfect health, and more fresh and green than those in houses from which the frost was kept out by fire-heat. Not a camellia bud has dropped.

A thermometer placed in the ground among the trees registered 33°; while one suspended in the house registered 21°.

On December 19, 1860, the frost became severe, and some young lemon-trees for stocks, which it was thought would not be wanted and therefore not housed, yet too valuable to be thrown away, were covered with mats two or three thick, and then with a coating of straw. On the 21st there was a considerable fall of snow; they were forgotten, and not uncovered till the middle of February. On taking off the mats and straw, the leaves of the greater part were found to be discoloured, but their stems and roots all alive and fresh, although they had been in moisture and darkness for two months, and lying on a cold clayey soil fully exposed to the north-east. Lemons and oranges may, therefore, be grown in pots, not only in cold orchard-houses where they will be cultivated by thousands, but also trained to walls with southern aspects, the pots being plunged and taken up annually early in November, then laid on the surface in a shallow trench at the foot of the wall, and parallel to it, and covered with mats and straw in frosty weather, uncovering them during the winter in continuous mild weather. About the first week in May, unless the season be unusually late and cold, the trees may be raised and trained to the wall, the pots being plunged as in the preceding season, following the same practice annually. I have found the painted table-covers answer remarkably well, as they arrest radiation effectually; so that full advantage is taken of earth-heat, hitherto so little thought of, although well known to exist.

Returning to the culture of fruit-trees in orchard-houses, it is very possible that some people may say, 'Why not always plant the trees in the borders, rather than in pots?' They may be so planted, as I have elsewhere stated, but there is much to be said in favour of pot-culture. In pots, the size and growth of the tree may be regulated with the greatest nicety; the annual root-pruning, summer-finishing, and surface-dressing can be done with so much facility. Indeed, as far as my experience has gone, I can honestly and lovingly recommend pots, vases, or boxes for fruit-trees in orchard-houses or fruit conservatories. In the 'Gardener's Magazine,' (vol. ii. page 278), peach-trees are mentioned as having been in pots twenty years without being repotted: they had been kept in health and fruitfulness by top-dressing only.

With respect to the flavour of peaches and nectarines from pots, it is to a certain extent at the command of the cultivator. The utmost piquancy is given to the fruit by placing the tree in the open air when the fruit is on the point of ripening. I am tempted to give the following paragraph from the note of a 'Country Parson,' who is a great lover of fruit-culture:—

'As regards peaches, few persons have had better opportunities of tasting them in perfection than I have; but certainly the best peaches I ever tasted were from trees in pots placed out of doors when the fruit was on the point of ripening, in front of a wall with a south-east aspect, and about two feet from it.'

Peach and nectarine trees planted in the borders of an orchard-house, either as standards or half-standards, will, however, give great satisfaction, particularly to the amateur who is his own gardener. When thus cultivated in *small* orchard-houses, they should be either root-pruned biennially or lifted, and replanted with a small quantity of rich compost to their roots—stiff loam and rotton manure, equal parts, is an excellent mixture—the last week in October; each tree should have, when replanted, from four to five gallons of water poured in before all the earth is filled in, and the same quantity about a week after. About the middle of November, when the surface of the earth has become dry, it should be firmly trodden down all round the stem of the tree.

In large orchard-houses, standards of peach, nectarine, and apricot trees may be grown with great advantage; they should be planted in the borders, and the soil made very firm about their roots;* in winter, from the end of October till the end of February, water should be withheld, and the border not dug in spring, but remain in its firm undug state from year to year. If the soil be naturally poor, some rich surface-dressing should be placed round the stem in a circle 2 feet in diameter, to retain water and prevent its running off the hard soil, and water given to the trees once a week during the summer.

Standards and half-standards—the former 5 to 6 feet in height, the latter from 3 to 4 feet—are more eligible for planting in the borders of large orchard-houses than pyramids, as the latter so soon lose their lower branches: in pots they are not liable to this disfigurement.

---

* In the calcareous sandy loams peculiar to this district, I find that the soil cannot be too firm for all kinds of stone fruits, whether in pots or planted in the borders: in the latter case, the soil around my trees is as solid as a well-trodden path. See p. 31.

An orchard-house in the warm districts in the south of England may be made to hold double the number of trees it would under the usual mode of culture, by the very simple method of removing half the number of peaches, nectarines, and apricots in pots to the open air about the middle of June, to ripen their fruit: this mode is practised by a friend in Sussex with great success. It is not till after the middle of June that such trees fully develop their leaves and young shoots, so that till then the trees may be placed very near to each other in the house. The trees placed out of doors will ripen their fruit three weeks or so after those in the house, and thus give a nice successional crop.

*Size of Pots.**

In potting trees for this description of culture, pots of different sizes may be used, according to the taste of the cultivator. If large trees for large houses are required, 18-inch pots (18 inches in diameter and 18 inches deep) will be necessary; for moderate-sized trees, 13-inch pots: this, on the whole, is a very eligible size. For smaller compact bushes, 11-inch pots are convenient, as they are not unwieldy, and the trees may be made ornaments of the sideboard in the dining-room; and beautiful objects they are when full of fruit. Miniature, yet fruitful, peach and nectarine trees may be grown in very small pots, for I have some not more than 9 inches high, in 8-inch pots, full of blossom-buds.

---

* It may save trouble if I here give the names of persons who supply articles used in orchard-house building, &c.:—

Pots.—Messrs. Scales, Green Lanes, Stoke Newington, London.

Glass.—Messrs. Phillips & Co., 180 Bishopsgate Without, London.

Anticorrosion Paint. (This should be mixed with raw linseed oil.)—Messrs. Carson & Son, 9 Great Winchester Street, London, E.C.

In remote places, where large pots are difficult to be procured, tubs like those used for orange-trees, or more properly boxes, may be employed with success, and for trees of large size—i.e. when they are from ten to fifteen years old—they will probably be absolutely necessary. They are easily made: boards an inch thick, either of oak or deal, should be firmly nailed together so as to form a box 15 inches deep and 20 to 24 inches square; the bottom should be formed with bars an inch thick placed about half an inch asunder, to allow the roots to penetrate into the borders, and to give thorough drainage.

Compost.

The best compost for all kinds of fruit-trees in pots is the top spit of a pasture with a tenacious loamy soil, or the same kind of loam from a ploughed field: this should be dug and exposed to the air for two or three months in the summer, and is then fit for use.

Two-thirds of this loam, with one-third of rotten manure, should be chopped up (not sifted) and well mixed. If it contains a large portion of lumps as big as an egg, so much the better. If only a light sandy loam can be procured, as is the case in some districts, the same proportions may be used; but the ramming-down of the compost must be firmer—in fact, it should be regularly pounded with a heavy pestle. I have reason to believe that more failures have taken place in the pot-culture of fruit-trees from the soil being too loose than from any other cause.

The above paragraphs have stood some years in print, and as far as they go the directions are sound. I have, however, gathered an idea with regard to compost which may be useful to amateurs, and which the experience of the present season (1865) seems to confirm. In other words, I have for some time suspected that which I now know, viz., the necessity of calcareous matter in all composts used in the cultivation of stone-fruits. Many orchard-house amateurs have for several seasons felt surprise at the robust healthy appearance of the apricot trees cultivated here in pots, and their extreme fertility. I had been so accustomed to perfect success in their culture that I felt no surprise, thinking it a matter of course, and scarcely crediting accounts I heard of their failure with some cultivators.

At last my attention was aroused, and I was induced to look into my soils, more particularly the loam used in potting fruit-trees. This I found to be, like all the soils in this district, full of finely comminuted chalk; and to this large preponderance in our sands and loams, amounting in the former to 25 per cent., I fully believe I owe a portion of the great success which attends the cultivation of orchard-house fruits here.

The question is, can this calcareous nature be given to composts used in the cultivation of fruit-trees in pots or in prepared borders? I believe it may, and with but little difficulty. It is merely procuring chalk from the districts where it exists. It is very cheap: a truck-load being easily dug and placed on the rail. This will, of course, be sent in lumps; all the preparation it requires is being reduced to powder, and half a peck of it mixed with a bushel of compost thought to require it. Or if we say, mix two bushels of powdered chalk to a one-horse load (twenty bushels) of compost, it will be near enough.

I believe this addition of chalk to composts not calcareous, and to loams of an irony nature, to be quite necessary in the culture of stone-fruits; and if not necessary, still most beneficial to all kinds of fruit-trees.

The fine cherries on pyramids, in pots, grafted on the Cerasus Mahaleb, now cultivated here, and the great success of plum-culture, are owing to the calcareous soil; so that I earnestly recommend chalk to be used in cases where it is at all comeatable.

APRICOTS.

APRICOTS in pots are very rarely seen, even in large establishments; they are difficult to force, as they will not bear the confined air of a forcing-house. I remember, some years since, being much struck with some apricots cultivated as dwarf trees in the south of France: the trees, full of their golden fruit, looked so beautiful, that I wished that our climate would allow us to grow them in the same way. I had not then thought of cheap glass, root-pruning, and pot-culture.

It must always be borne in mind that, without abundance of air and the full light of an unshaded roof,* fruit of high flavour cannot be grown; the trees will bear well, but their fruit will be vapid and flavourless.

Many gardeners and amateurs have failed, to a certain extent, in the culture of apricots in orchard-houses, owing to the trees not having air enough when they are in bloom. This is a great mistake, and the effect of the old-fashioned idea that a dry cold wind blowing through the house must injure the blossoms. If such cultivators could visit the south of France in March, when apricot and almond trees are in full bloom, and the 'bise,' or north wind, blowing without injury to the blossoms, they would not fear any evil effects from a cold dry March wind blowing through the department of the orchard-house in which apricot and almond trees are placed.* It is so well known a truth that all stone-fruits flourish best in climates dry and cold in winter and early spring, and dry and hot in autumn, that it seems like Sunday-school teaching to mention it here. There is no fruit equal, in my opinion, to a fine peach-apricot ripened in an orchard-house: when slightly shrivelled at the stalk, it is a bag of the most delicious and refreshing syrup.

---

* In sunny climates in the south of England, if it be thought desirable to train a few vines under the roof of an orchard-house, they should be at least twelve feet apart, and pruned closely on the spur-system, so as to give as little shade as possible.

The best trees for pot-culture are such as have been in pots one or two years: if these can be purchased, so much the better. The next best are trees that have been removed and cut down one year in the nursery. If neither of the above can be found, 'dwarf maiden trees'* will do. Trees taken from the open ground must not be potted till the end of October. Presuming that potted trees have been procured, they may, early in October (or, if omitted then, in November or December), be repotted into pots of the size selected for this system. I have named 11-inch pots, because they are portable, and the trees may then be shifted into large pots as they advance in growth; 11-inch pots will, at any rate, do well to commence with. October, November, and December are the best months for potting trees; they may indeed be potted till March, but then no fruit must be expected the first season. If fruit-bearing trees grown in pots have been procured, they cannot be potted too early in October.

---

* It is the still hoarfrosts that are so fatal to the well-doing of fruit blossoms out of doors, not dry cold winds. In orchard-houses, stagnant humid air is equally fatal.

If you examine an 11-inch pot, you will find it 8 inches across at the bottom, and the aperture from 1 inch to 1½ inch in diameter. Take a light hammer, and enlarge this aperture to 5 inches in diameter;† then place four or five large pieces of broken pots or tiles across, so that they rest on the inside ledge left by the hammer, leaving interstices for the free emission of roots. On these place some of the most lumpy part of your compost; then your tree, not too deep, but so that the upper parts of its roots are a little below the rim of the pot: if it has a ball of earth, loosen it. Fill up with compost; ram the earth down firmly, as you fill, with a stout blunt-pointed stick. Place it on the border where it is to grow during the summer; give it two or three gallons of water, with a top-dressing of some manure to lie loosely on the surface, and the operation is finished.

---

* This is a term applied by nurserymen to trees one year old from the bud or graft.

† I now have my pots made with five holes, each an inch and a half in diameter. In remote places, where these cannot be procured, the enlarged holes may be used.

Fruit-trees of all kinds may be potted in autumn; and if the orchard-house is not ready for them, they may be kept in any shed till the beginning of February, covering the pots thickly with litter, to keep the roots from being injured by severe frosts.

If the soil over which the house is built be dry and sandy, the pots (this applies to all kinds of fruit-trees) may be plunged two-thirds of their depth; this saves much watering. They must, however, be lifted as directed in Calendar (p. 176).

Trees in pots, placed on the surface, will require in hot weather from one to two gallons of water each, once a day. In cool cloudy weather this quantity may be given about twice a week.

We will suppose that our tree, a nice dwarf bush, with five, six, or seven branches,* is potted.

---

* If a tree with only three or four branches is potted, they must be cut into four inches; and the tree must have a season's growth to form itself.

It may rest till February, and then be pruned: a pleasant simple operation, the performance of which is more easily shown than described. I may as well now state, that the pruning recommended here for apricots will serve for all bush fruit-trees under orchard-house culture, except peaches, nectarines, and figs. Each branch must be shortened with a sharp knife to ten inches: these shortened branches will form the foundation of a nice regularly shaped bush. In May each branch will put forth three or four shoots: all of these but the topmost one, as soon as they have made seven leaves, must be pinched off to within five full-sized leaves of their bases: they will form fruit-bearing spurs. These will continue all through the summer to make fresh shoots, which must always be pinched off to five leaves. The leading shoots, which will make vigorous growth, should have their tops pinched off to seven leaves when they have made nine or ten leaves; and when young shoots break forth from these pinched shoots, they should again and again be pinched to five full-sized leaves. In other words, if every young shoot has its top pinched off as soon as it has grown five inches, and this all through the summer, it will be safe practice. The summer is past; the month of October is with us. The tree has ceased to grow; its shoots are ripe; it must be put to rest for the winter by lifting up the pot, and cutting off closely every root that has made its way into the border: it is then ready for its top-dressing, the method of giving which I shall describe further on.

The second season:—In February, or early in March, the leading shoot made the preceding year, and which ought to be from two to three feet long, must be shortened to ten inches, and the young shoots, as they push forth in summer, be pinched off as in the first season. The third season:—As the tree will have increased in size, its leading shoots may be shortened to six inches; and as it becomes aged and fruitful, annually to four inches, and at last pinched off in summer to two inches, so as to make a compact round bush. In the course of time some of the shoots in the centre of the tree will require thinning out with the knife, if at all crowded.

A more simple mode of pruning even than that above given, is to purchase a bush apricot of two or three years' growth, and during the spring and summer to pinch *every shoot* to five full-sized leaves as soon as it has made six or seven, exactly as recommended for pyramids (p. 67). Trees thus treated increase slowly in size, but they form compact and most fruitful bushes. I fully believe that this simple mode of pruning, which even a lady may find pleasure in carrying out, will do away with one great difficulty in orchard-house culture—that of a spring pruning, always so difficult to teach. I recommend the shoots being pinched back to five or seven leaves (not counting the two or three small leaves at the base of the shoot) instead of three, as in bush peaches, because the buds of apricots are so close together.

The general management of the trees the second year should be as follows:—

February is with us, and, if the season be mild, buds are beginning to swell, and flowers to bloom; the trees in your orchard-house are, however, dry and stagnant. Place them in their stations, 3 feet stem from stem; give each of them a small quantity, say a quart, of water—not, however, if the frost be severe; let them rest three days, then give them two quarts each; in short, gradually saturate the earth in the pots, and when the trees are in full bloom, make holes in the centre of the earth in the pots with a pointed iron rod, and give each tree two gallons; afterwards water them regularly according to the state of the weather. The buds, if the weather be mild, will soon begin to swell, and in March, or early in April if the season be late, they will put forth their full bloom; and beautiful things they are, for no frosts, no storms, will destroy the blossoms. If the weather be sunny, with sharp frost at night, as is often the case in early spring, the shutters, both back and front, may be opened all day and closed at night: if a wind-frost and cloudy weather, they may be closed day and night; the ventilation through the joints of the boards will then be amply sufficient. With this treatment nearly every blossom will set.

From recent experience, I find that apricot-trees are not liable to the red spider, and the fruit seems to like a dry warm climate; they therefore require syringing but once a week, as too much syringing brings on black spots on the surface of the fruit, and decay. Weak liquid manure may be given once a week during the summer. This is, however, almost a matter of choice. My trees grow and bear well without it. Guano-water, one pound to twelve gallons, is perhaps as good as any; and a good soaking of this once a week is better than using it more frequently. While in their young state, the fruit must be thinned, leaving, at first, upon a bush that has been two years in a pot, about three dozen; which, when they attain the size of a small nutmeg, must be reduced to 12 or 18.* The third year, a tree, if it has prospered, will be able to bring two dozen to maturity; it is, however, better to have a few finely grown fruit, than many that are small. If some of the trees are required to decorate the dessert (and what can be more ornamental than an apricot-tree full of fruit?), they may be made ready for removal by lifting the pots, to keep the roots from running too deeply into the border. This is best done about four times in the course of the summer—say June 10th and 25th, July 10th and 25th. The young roots are thus broken off, and arrested in their progress downwards, and they then form numerous spongioles, which keep on the surface of the border, and obtain wholesome food. It is now decided here, from recent practice, that it is better to feed orchard-house trees from above by rich surface-dressings, than to allow their roots to penetrate deeply into the border. Trees that have been used to ornament the dessert should be replaced in the orchard-house after the fruit is gathered, and have water till the end of October.

---

* Instead of pulling off the fruit, which often lacerates the bark, they should be cut off with the point of a sharp penknife.

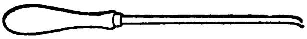
To sustain trees in health in pots, something more must be done than allowing their roots to go into the border. Annually, in October, every tree should have a top-dressing of rich compost. I have employed, with much success, horse-droppings gathered from the roads, and unctuous loam, equal parts. The former I have saturated with night-soil or liquid manure, and then exposed to the air for two or three months before mixing it with the loam. Some powdered charcoal strewed over this compost will prevent any disagreeable smell. Any kind of rotten- manure and loam seems, however, to answer well for top-dressing, which is done in the following manner:—Take out a portion of the soil 6 inches in depth, and about 4 inches in width, all round the side of the pot, leaving the central mass of roots undisturbed (a portion of the mould may, however, be picked out from among the mass of fibres with advantage, as fresh food can do them no harm); then fill in the compost, and ram it firmly down; keep on filling and ramming, till it is on a level with the edge of the pot; place some of the compost loosely on the surface, two to three inches in depth, as it will settle much during the winter; give one or two good soakings of water; and then place the trees close together, for you will thus have more space for winter parsley, lettuces, young cauliflowers, and other matters requiring shelter. Water must be withheld, and the trees suffered to remain dry and completely at rest during the winter.

In spring, as soon as the fruit is set, and about the size of horse-beans, place on the surface of each pot some rotten manure, about two inches in depth; to make this surface-dressing more powerful, one pint of guano or of powdered oilcake should be mixed to a peck of rotten manure; this will feed the roots and keep the surface moist. I have recently found the following compost most valuable for spring and summer surface-dressings: horse-droppings from the roads, and malt-dust or kiln-dust (they differ slightly), equal quantities, mixed, thrown into a bed one foot deep and saturated with strong liquid manure. The day after mixing and saturation it is fit for use. Its smell is at first disagreeable, but a bottle of Burnett's disinfecting fluid soon puts a stop to this unpleasant matter. I have never seen any surface-dressing equal to this in its effect; it produces almost a magical growth in trees. If there be any difficulty in procuring horse-droppings, the rotten manure from an old hot-bed finely chopped and mixed with an equal quantity of malt or kiln dust, makes an excellent surface-dressing. Or in default of malt dust, finely chopped rotten manure saturated with liquid manure will answer well. The summer surface-dressings should never be of coarse manure; they should always be finely chopped. This treatment may be continued every year without variation.

There is a method of feeding trees in pots, which I have lately practised—feeding from above only. To do this, two bricks should be placed parallel to each other, and 6 inches apart; on these the pots should be placed, so that the water given to the tree may run off freely. A pot standing thus has the warm air of the house under it, as well as round its sides. The effect is very remarkable; for if the tree has frequent surface-dressings, the water, which may be more freely given when it stands on the ground, carries down the rich food very rapidly, and very fine fruit are produced. Peach and nectarine trees, with leaves inclined to be yellow from having had too much water, should be thus treated. By this method, the trouble of lifting the trees in June and July is spared; but more water is required, and so the trouble is about equal. It will be necessary in very dry winters to watch the trees to see if their shoots shrivel; if so, they must have a small quantity of water, but not in severe frost; and if the winter be severe, to 'make assurance doubly sure,' some dry hay or litter may be laid on and around the pots, so as to make the roots perfectly safe from the effects of severe frost.

The best implement for the autumnal top-dressing is a piece of iron rod an inch and a half in circumference and nine inches long, flattened at the end, with a handle of wood five inches long, like the annexed figure (fig 9).

FIG. 9.



Now let us see what we may expect from this treatment. The apricot, the peach, and nectarine, as is well known, all come from the East. We will take Persia or Armenia. The winter there is dry and very severe; the spring dry, with hot sun and piercing wind, just when peaches and apricots are in full bloom, and yet how they succeed! Let any one go into an orchard-house when we have our usual March weather: the wind will whistle through it, and the climate will be dry, sunny, and bracing; the blossoms, under these circumstances, will all set. Unfortunately, we cannot command sunshine enough to carry us along, to make our fruit ripen in May and June, as in warmer climates; we must, therefore, wait patiently, for our orchard-house climate is slow but sure in its operations. If the above directions are followed, Eastern nature is imitated as closely as our cloudy skies permit. The trees bloom in a dry airy place; they pass through a comparatively dry warm summer; they are, like all trees natives of dry climates, early in a state of perfect rest, which is continued all through the winter, and thus they form healthy shoots and well-developed blossom-buds. Nothing in culture can be more perfect, and all is so simple, that, knowing as I do with what facility it is performed, I regret being obliged to use so many words in describing it.

It will be seen that I have, to carry out this system, recommended houses of wood and glass; those, however, who prefer brick to wooden walls, may have them; as any green-house can be made into an orchard-house by merely lowering the roof to the height given in page 5, and having sliding shutters back and front. The grand essentials are, for a small orchard-house, a roof not too lofty, borders instead of benches, and constant lateral ventilation, more or less, according to the state of the weather, through the shutters; but in houses with brick walls there will not be that constant gentle percolation of air which there is through boarded houses, and which in the south of England is so highly favourable to the well-being of stone-fruits.

The trees in pots should be placed on the borders, back and front, 3 feet apart, stem from stem. A large span-roofed house 100 feet long and 24 feet wide, with a path 5 feet wide in the centre, will hold about 180 trees in pots, or 36 trees to every 20 feet in length. A house 20 feet by 14 will thus hold 24 trees. Twenty-four trees will give from sixty to seventy dozen of fruit when in full bearing. A small bush of the Pitmaston orange-nectarine, four years old, produced one season four dozen of fruit, and brought them all to perfection; still this is too many, as some of the fruit were small. I mention this merely to show what can and may be done by this very interesting mode of cultivation, which, to sum up, is as follows:—Annual top-dressing, surface-dressing in summer, annual summer pruning by pinching, autumnal or spring pruning, and root-pruning.

There are, I well know, some amateur as well as professional gardeners who object to the pot-culture of apricots; to such I can with confidence recommend the planting of apricot-trees in the borders, and root-pruning them biennially about the end of September: they soon form compact and most fruitful bushes. If, however, the trees are carefully kept under summer pinching, root-pruning may be dispensed with. I have some trees under this treatment remarkable for their healthy and sturdy growth.

The season of that very fine sort, the Peach-Apricot, may be prolonged to a great extent; it generally ripens in the orchard-house about the first week in August, but by the following simple method it may be had in perfection till early in October. At the end of June, some trees full of fruit should be selected, and those for a very late crop should be placed under a north wall till the first week in September, and then removed to the orchard-house to ripen their fruit in October. Those that are to ripen in September should be placed in a sunny exposed situation till the end of August, and then be removed to the orchard-house. The fruit from trees that are much retarded will not always prove good, unless the weather be fine and warm; but that from trees set out of doors in a sunny place, and then ripened in the house, will be most excellent.

Half-standard apricots may be made charming ornamental trees for the summer decoration of the flower-garden. For this purpose trees with nice straight stems, about three feet in height, should be selected, and planted in pots or tubs. They should be grown in the orchard-house, and about the middle of July be removed to the lawn, or any part of the garden where such trees would be desirable. They can be pinched into round heads and employed for summer ornaments, just as orange-trees are in many gardens: they will be found equally ornamental and more useful, because their fruit is valuable.

The most desirable sorts of apricots for pot-culture are: the Oulins' Early Peach, the earliest large apricot; the Large Early, St. Ambroise, which follows very closely; the Kaisha; the Blenheim; the Royal; and the Peach-Apricot (like the Moor Park, but larger and a better bearer). These are placed as nearly as possible in the order of their ripening, and give a good succession.

They will come in earlier than those on walls. It must, however, be understood that fruits in thoroughly ventilated orchard-houses are not much forwarded, unless the season happens to be very sunny. It is not an *early* but a *certain* crop that must be expected. I have not named any later kind than the Peach-Apricot, because it is so easily retarded, and is always of the highest excellence; it is also the most abundant bearer of all.

APRICOTS AS PYRAMIDS.

This most charming mode of growing apricots in pots will in a short time be the *only* method followed.

The management and pruning of pyramidal

apricots are 'pruning made easy,' so that any lady may attend to her trees without fear of committing herself by taking off a wrong shoot.

Pyramids in pots may now be bought in the nurseries. They should be potted in October or November in 13-inch pots, and if they have been properly managed they will bear a fine crop of fruit the first season after potting. The fruit should be thinned exactly as recommended for bush-trees, and as soon as the trees put forth their young shoots in May, pinching must be commenced. What a pleasing pastime it is! Every shoot but one—the leading shoot—as soon as it has made six or seven leaves, must have its sixth leaf with the end of the shoot pinched or cut off with a penknife, leaving five leaves, exclusive of three or four small leaves generally found at the base of every apricot shoot. The leading shoot must be allowed to grow longer, and then pinched so as to leave nine leaves. Two or three shoots will break out from this leading shoot; all but one of these should be pinched down to five leaves, and when this has made ten leaves, pinch down to nine; this will require to be done two or three times during the summer, the tree gradually increasing in height. All the pinched shoots growing from the stem and side branches of the tree, after the first pinching, will put forth numerous young shoots; all these must be pinched off to five leaves, as soon as they have made six or seven. This must be constantly attended to till the trees cease growing. Many of my trees have often been pinched from four to five times, and every branch from bottom to top of the stems is always a cluster of blossom-buds.

The tree must be formed into a cylinder or cone by pinching (the term 'pyramid' is incorrect, yet no other offers itself), and I need not say how beautiful such trees are when studded with their golden fruit. I firmly believe that no object ever placed under the hands of a gardener will deserve or claim such admiration as a conical apricot-tree, seven to eight feet high, full of fruit. Trees of this description may be planted in the borders of the orchard-house, but on the whole, as with peaches and nectarines, I prefer pot-culture for pyramidal apricot-trees.

By growing the Peach-Apricot in this manner in cheap houses, our markets can be supplied with apricots at a price not at present thought of.

Our market-gardeners, at present wedded to their wall-culture of fruit-trees, will do well to cover a few acres of ground with cheap orchard-houses, and to plant out in them half-standard and standard apricot-trees. Covent Garden will then be supplied with such apricots as have rarely been seen there. They may be sold cheap, and yet yield a fortune to the growers. The Peach and the Moor Park Apricot are the only kinds adapted for this profitable mode of culture.

If pyramidal apricot-trees cannot be bought, maiden-trees may be potted in October, their side shoots pruned in to within two inches of the stem, and the following summer they will, with constant pinching, make very nice pyramids.

The trees, when planted out, will require in spring a light dressing of the surface-dressing compost on the surface round their stems, and of course water during the summer, although not nearly to the extent required by potted trees.

Pyramids in pots may stand 20 inches asunder stem from stem. Pyramids planted out in the borders of the orchard-house may be planted 3 feet apart. After a few years—for they increase in bulk slowly—the distance may be extended to 5 feet apart; as the trees may be transplanted without a serious check, these changes are easily made.

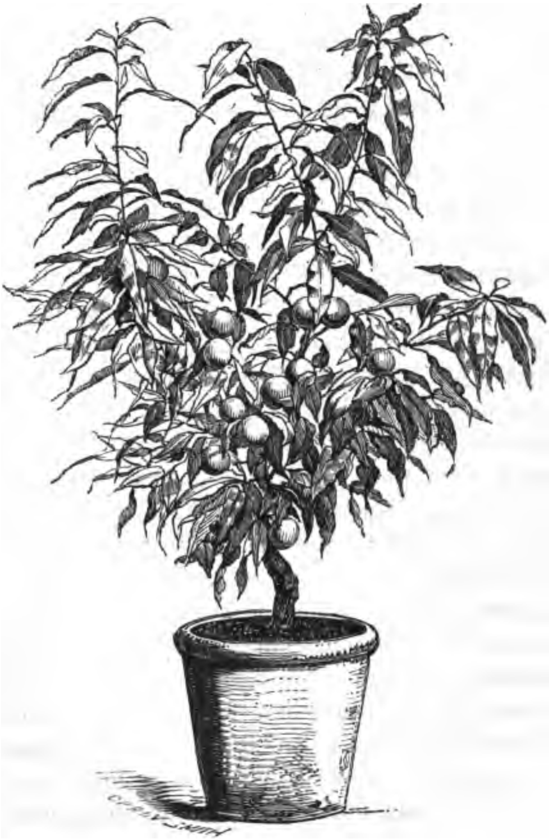
PEACHES AND NECTARINES.

Few fruit-trees give more satisfaction in the orchard-house than a choice selection of peaches and nectarines: when in blossom, in early spring, the trees are so fresh and beautiful; they are so exceedingly prolific; and in autumn what fruit can vie in beauty with a ripe peach or nectarine? and what, to the lover of fruit-trees, can be more gratifying than to see his sideboard or dining-table decorated with peach-bushes in pots, studded with their lovely and perfectly ripened fruit?

If bushes of only a moderate size be required, 11-inch pots, as recommended for apricots, may be used. It is surprising to see the vigorous growth and fine fruit of peach-trees in 11-inch pots; for owing to the compost being rammed down, a large quantity of nutriment is comprised in a small space. I may as well, however, state, once for all, and for all descriptions of fruits, that, if fewer and larger trees be required, larger pots may be employed; thus, 13- 15- or 18-inch pots may be used with equal success, by having numerous apertures at the bottom, allowing the emission of roots during summer, root-pruning, and putting the tree to rest during winter. A peach or nectarine-tree may thus, in two or three years, be made capable of bearing many dozens of fruit: but I must confess that my taste inclines to small prolific trees, because one can have greater variety in a small space; and small trees are pretty, and easily looked over, so that each leaf and bud, each blossom and fruit, is known.

If peach-trees already in pots, and in a bearing state, can be purchased, so much the better, for then a year is saved; but as such are more expensive than either 'maiden' or 'cut-down' trees, the cost of which is generally about 1*s.* 6*d.* to 2*s.* 6*d.* each, these had better be purchased. I may here state that 'cut-down' trees are two years old, and if nice healthy trees with fully ripened shoots can be found, they are better than 'maiden'

FIG. 10.



An Elruge Nectarine-Tree, three years old.

(From a Daguerreotype.)

trees. But as they are not often to be met with, I will first give the treatment required by one-year-old or 'maiden' trees.

These have one shoot, more or less vigorous, which should be well furnished with buds towards its base. This shoot must be cut clean off with a sharp knife, at the seventh bud from its base, and the tree then potted in the same compost recommended for apricots, in the same-sized pots, and at the same season, being towards the end of October, or early in November.* The following summer every bud will, or ought to, produce a shoot. If there are seven shoots, the tree is formed for the season: they need not have their tops pinched off, but will merely require the laterals (small side-shoots) pinched off to within two buds of their bases, as soon as they are four inches long. This will induce the ripening of the shoots, so that by the end of the summer they will be full of blossom-buds. At the end of August the point of each shoot should be pinched off, and they will then only require the annual pruning, either in autumn or in spring, for which directions are given below. If the tree puts forth a fewer number of shoots than seven, the tops of all should be pinched off early in June; each shoot will then put forth three or more young shoots; all that are not required to form the tree must be pinched off in the same way as laterals, leaving seven or, if the tree be vigorous, nine shoots to each tree. These trifling manipulations are easy to do, but difficult to describe: so, to make the matter as clear as possible, let us place a young tree before us early in June, with five branches, each twelve inches in length; then let us, with a sharp penknife, shorten each branch to nine inches; then, at the end of June, let us take the same tree in hand, and we shall find that each shortened branch has put forth two or three shoots; we must pinch these so as to leave on four branches two, and on one only one, making nine shoots, which as they grow should have their laterals pinched off regularly; they will then make vigorous trees in one summer, and form an abundance of blossom-buds. No other pruning is necessary the first season; and if abundant ventilation and syringing daily, as recommended for apricots, have been attended to, the fruit-buds will, towards the end of August, begin to be fully developed. The experienced gardener can at once distinguish them: such a person may prune his trees early in October. Let me endeavour to tell how to distinguish a fruit-bud, which, by the way, is the only bud to prune down to.

---

* This season is recommended, but it may be departed from; for my peaches and nectarines are sometimes not potted till March, yet they make fine growth.

Well, then, generally—or 'general always,' as a foreign friend expresses it, when he wishes to say anything that invariably takes place—towards the base of each of your seven or nine shoots, you will find four or five pointed single buds, covered with their brown coat: these are leaf-buds. Next to these, and higher up the shoots, are triple buds—a plump silver-coated one on each side, and a thin one in the centre: these plump silvery buds are blossom-buds, and the central one a leaf-bud, which produces a shoot, so necessary to the well-being of the blossom-buds, that without it they would be abortive. Be sure to have on each shoot, if possible, nine to twelve of these triple buds, and cut off the shoot close to one of them; if this cannot be found at the proper place, so as to be able to form the foundation of a nice, regularly shaped, bush-like tree, cut off the shoot at a leaf-bud. If the trees be pruned in autumn, the buds are difficult to distinguish; it will, therefore, be better for the beginner not to prune his peach and nectarine-trees till February, or early in March, when every bud will plainly show its character; the blossom-buds by that time will have opened their silvery coat, and the bright pink will be peeping out. If the shoot be cut off at a single blossom-bud, it will die down to the next leaf-bud; this must, therefore, be carefully avoided.

Let us now proceed with the culture of our maiden tree. A season has passed; it is early spring, say the middle of February, and our tree, with its nine branches of the last summer's growth, is before us: three of these should be cut down to within five buds of their bases, to give a supply of young shoots for the succeeding year, and six should be cut down so as to leave on each branch ten or twelve triple buds. These are the fruit-bearing branches for the present season—and so it must be every year; a few branches, say one-third, must be cut in closely on opposite sides of the tree to give young shoots, and the remainder left as above to bear fruit. Those shoots that have borne fruit will often require to be cut out, to make the tree dwarf and prevent its becoming naked, as the spurs die after bearing, unlike those of the apricot and plum, which continue to bear fruit for many years. Much will depend upon the sort cultivated, and the vigour of the tree. One thing must be borne in mind —do not let the tree become bare of young shoots towards its base, and tall and straggling. If pruned in spring, the nature of every bud may be seen, and the tree formed, by the proper use of the knife, into a fruitful beautiful bush.* From twelve to fifteen leading shoots should be left, in summer pruning, on each tree when in a full bearing state.

---

* When the trees are in a bearing state, many short spur-like shoots, from four to six inches long, will be made every season on the stem and towards the base of the principal branches. These will be generally covered with single blossom-buds and a terminal leaf-bud: they may be removed if too much crowded, *but never shortened.*

I have thus endeavoured to follow the 'maiden' tree to its fruiting state. The 'cut-down' tree, which should have four or five branches, should be potted in autumn and pruned in early spring: each branch must be shortened to six inches; these will put forth numerous young shoots, which in June should be thinned out with a sharp knife, leaving nine or more shoots to be pruned the following spring, as above directed. If trees in pots three or four years old in a bearing state can be purchased, it is a saving of time; for, if they be potted before Christmas, a crop of fruit may be expected the ensuing summer. In such trees, the shoots intended to bear fruit, and covered with triple blossom-buds, may be shortened to ten buds, and those which are to make young shoots for the next year's bearing should be shortened to five buds.

SUMMER PINCHING.

Pruning of bush-trees by summer pinching only has been practised here to a large extent. As this is the most simple of all the methods of pruning known, and may be practised by any lover of gardening who does not mind employing his finger and thumb when walking in his orchard-house, it is worthy of a few lines of description.

A peach or nectarine tree of the usual bush-like form, two, three, or four years old, may be potted in the autumn. In March its shoots should be shortened to about half their length, forming the tree into a round bush. In May it will put forth young shoots. As soon as they have made four or five leaves, the fourth leaf, with the end of the shoot, must be pinched off, leaving three leaves exclusive of one or two small leaves at the base of the shoot, which are without buds: every shoot must be thus operated on. In eight or ten days a fresh crop of shoots will show itself, for from the bud at the base of every leaf a shoot will spring forth. These, as soon as they are ready, must all be pinched down to three leaves, and so on all through the summer with every fresh crop of young shoots till the end of July: for if the pinching be continued till the end of August, a great number of the shoots will be a mass of blossom-buds, without a terminal shoot or leaf-bud; and although they may be cut out, and yet leave more blossoms than the tree can carry on to a fruiting state, it is as well to have most of the spurs with a terminal shoot or leaf-bud. If bush-trees are in very large pots, or planted in the borders of a large house, and it is desired to have them increase more rapidly in size than pinching to three leaves will lead to, the pinching should be at the sixth or eighth leaf, leaving five or seven in every operation instead of three. This is applicable to all kinds of fruit-trees under summer pinching, when large trees are wished for. My trees, under this incessant pinching, are sturdy bushes, full of blossom-buds, and quite pictures of robust health, and the fruit they bear is always large and high-coloured, owing to its full exposure to the sun. In March it will be good practice to thin out some of the numerous blooming spurs and clusters of blossom-buds with a sharp penknife; otherwise the trees will be too much crowded with blossoms. This thinning out may also often be done in summer with advantage, for if the trees grow very luxuriantly, the young shoots become crowded, and the thick mass of leaves shades the fruit too much; in such cases the young shoots may be thinned out in the month of July, much to the advantage of the tree.

This simple and charming method of pruning, only occurring to me in 1858, was fully carried out in the summer of 1859. I am quite at a loss to account for its not having been discovered earlier. As far as regards myself, I think it was the fear of inducing, by incessant pinching, too many young shoots to break out, that deterred me from practising it. Reasoning from theory only, I imagined it to be impossible for young shoots made in August to ripen, forgetting the warm autumnal atmosphere of the orchard-house. I do not hesitate to assert that this simple step forward of pruning by incessant summer pinching, is one of the most successful advances that have ever been made in fruit-tree culture under glass.

I may add, that if by any neglect the pinching of the shoots in June and July has not been attended to, so that the trees have made shoots of from 2 to 3 feet in length, these may be shortened with a sharp knife to 10 or 12 leaves. The bud at the end will then form itself into a leaf-bud, and even make some small growth, while all the buds below will remain fruit-buds, and quite dormant till spring. I tried this experiment in August 1861.

No anxiety need now be felt even by the lady orchard-house cultivator—no advice need be asked of the too-often-unwilling-to-give-it gardener. Thinning in early spring those pretty clusters of blossoms with a penknife (for they are always too numerous, and at least half of them may be cut out), and at the same time shortening shoots that are irregular; and in summer pinching off the ends of the young shoots, always fragrant, so as to give symmetry to the tree and make it pleasant to look on, are all agreeable operations. The climate of the orchard-house will do all the rest, and a peach-tree in a pot *will* bear fruit even under very adverse pruning circumstances, much more under a lady's loving, yet pinching, care. All that seems to be required is to make the tree symmetrical, and prevent its bearing too bountifully; for it must be borne in mind that fruit from a tree overloaded, whether under glass or in the open air, is never of fine flavour. Peaches, pears, plums, apples, and indeed all descriptions of fruit, suffer in flavour to an extent scarcely thought of, if the tree be allowed to bear too many. It is better to have one dozen of peaches large, and of fine flavour, than two dozen small and inferior; besides this, a tree suffered to bear too large a crop will be sure to fail the following season.

GENERAL CULTURE.

I need not repeat here the directions for general management I have given for apricots: exactly the same is required for peaches and nectarines, which may be grown with them; the same top-dressing, liquid-manuring, syringing, root-pruning, and winter management. In summer the soil in the pots must not be too much saturated with water, or the leaves of peach-trees will turn yellow and the fruit become insipid.

Peaches and nectarines, either in the open air or under glass, are in our climate inclined to grow too vigorously: pot-culture here gives a great advantage. The trees should be lifted, so as to break off all the roots that are entering the border from the apertures at the bottom of the pot: this operation should be performed once a week, commencing the second week in June (see Calendar, p. 176), and continued till the end of July; they may then be suffered to make roots into the border till the fruit is gathered. By this treatment the trees become sturdy and short-jointed, i. e. very short spaces will be found between the buds. Trees that have been from five to seven years in pots will require abundance of water daily, in summer; as the pots become full of roots, and absorb a large quantity. When trees of several years' growth are shifted into larger pots, large coiled roots will be found at the bottom; these should not be cut or pruned in any way.

VENTILATION.

There is a matter of importance in the culture of peaches and nectarines, to which I beg the reader's special attention, although it is a repetition—and that is free ventilation. In the warmer parts of England, and more particularly in Surrey, I have heard of failures in growing peaches and nectarines in orchard-houses, owing entirely to the attacks of the red spider, brought on by the unskilful management of servants, calling themselves gardeners, who would persist in shutting up their houses at four o'clock in the afternoon in hot weather, and not opening them till nine in the morning; the poor trees were thus suffocated, and so enfeebled as not to be able to resist the attacks of this most persevering and insidious enemy. Now let me advise any one who has such a servant to open all the shutters about the first week in July, and have them nailed so that they cannot be closed; they may remain so till September 1. If the trees are regularly syringed, no red spider will make its appearance, and the fruit will be of much finer flavour for this constant and free ventilation. The usual and proper mode of ventilation is to have the shutters open by day all through the spring and early summer months (in the south of England the dry cold winds may blow through the house in bright days, while the trees are blooming, with much benefit to the blossoms), and open night and day as soon as the peaches begin to colour, unless the house be in a very exposed place, and the weather cold and windy; then they should be only partially open. These ventilating shutters should always be on a low level—the lower edge of the aperture about two feet from the ground—and at the same level back and front in lean-to houses, as must be the case with those on each side in span-roofed houses.

In situations much exposed to wind, netting with small meshes, or, if not convenient, common netting, double or treble, should be fixed inside the ventilators so as not to interfere with their being closed. This may remain from the time the trees are in bloom till the fruit is gathered. It will prevent strong currents of air from injuring the young leaves. But few gardeners have the courage to give air enough to orchard-houses and vineries; in my lean-to vineries, without fire-heat, abundance of air is given night and day, from the middle of July till the grapes are ripe.

RETARDING.

A very simple and agreeable method of retarding such mid-season peaches as the Noblesse, Royal George, and Grosse Mignonne, and all mid-season nectarines, may be practised as follows:—Remove the trees from the orchard-house to the open air at the end of July; place them in some warm sheltered place, or in front of a south or south-west wall, about two feet from it. In a few days both peaches and nectarines will change to a deep crimson, and, if the weather be sunny, their flavour when they ripen will be very vinous and piquant. Under this treatment, such sorts as I have named above will ripen by the end of September, or later, according to the state of the weather. By this method, the season of our fine melting peaches and nectarines may be much prolonged, and, in cases where the absence of a family may require it, the whole crop of an orchard-house can be retarded. Half-standard peaches and nectarines with nice round heads may be used as ornamental trees, in the same way as recommended for apricots; in the south of England they will ripen their fruit in the open air very late in autumn.

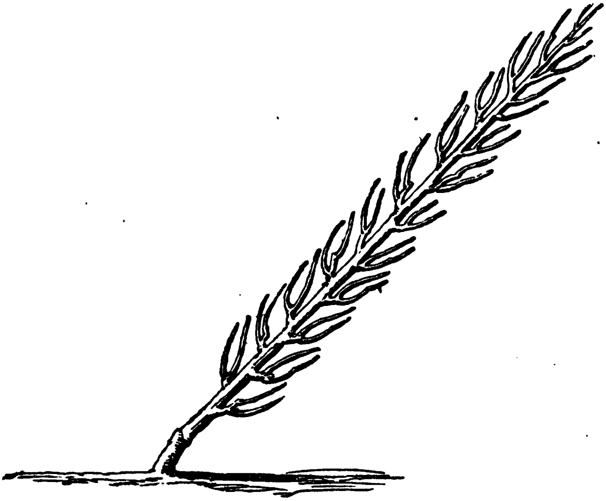
GATHERING THE FRUIT.

Some attention is required in choosing the proper time to gather peaches; for in the calm still air of the orchard-house, many kinds will hang on the trees till they are dead ripe and nearly worthless. As soon as a peach is quite soft close to the stalk, it is fit to gather; and although it may hang a day or two after it is found to be fit, a longer period will spoil its flavour. Nectarines may be allowed to hang for some days after they are ripe, and if they are inclined to shrivel on the trees, they will be found very rich. Apricots, in like manner, may hang on the trees till they shrivel slightly, and when in that state no fruit grown in England can equal them in richness and juiciness. Apricots from walls, generally ripened thoroughly on one side only, are very inferior in comparison. I ought not to omit to mention, that many peaches that fall off when just on the point of ripening, but not ripe enough to eat, make excellent peach jam.

PYRAMIDAL PEACH AND NECTARINE TREES.

Within these few years a method of growing peach-trees against walls has been brought into notice in France. This is called training 'en cordon oblique' (fig. 11), and is carried out by planting against walls maiden trees 20 inches or 2 feet apart at an 'angle of forty-five degrees.' The lateral shoots are shortened in closely, and rigid summer pinching is practised, so that a wall is soon completely covered with short fruit-bearing shoots. In warm climates and in dry soils this method has been found to answer very well, but has been objected to in climates and soils of a contrary description, as the vigour of the trees is not restrained enough by the most severe summer pinching. The French gardeners do not know, or will not practise, root-pruning, which

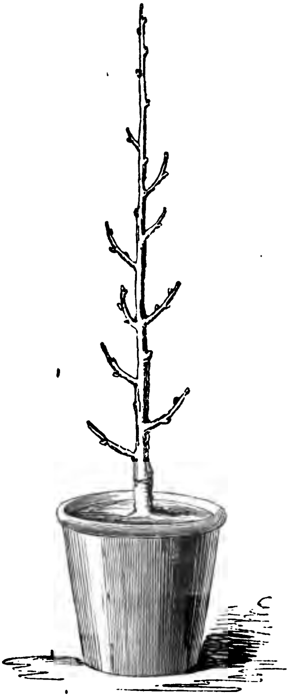
Fig. 11.



A Peach-Tree trained 'en cordon oblique.'

would doubtless make these very pretty trees abundantly fruitful. Fig. 11 is one of these oblique trees, from the work on Pruning by M. Hardy.

FIG. 12.



A Maiden Peach-Tree pruned to form a close Pyramid.

I now propose a modification of this mode of culture for the orchard-house, by forming peach and nectarine-trees into close compact pyramids, like an upright cypress, and annex a figure of a maiden tree potted and pruned (fig. 12). For this purpose, maiden trees with straight stems, and well furnished with lateral shoots, should be selected, and planted in 11-inch pots. They should not be more than from 4 to 5 feet high; if more, their tops may be cut off to that height. Each lateral shoot should be cut into two buds; these and the buds on the stem will in May give numerous shoots. As soon as they have made four or five leaves, pinch off the fourth leaf with the end of the shoot, leaving three, not reckoning one or two small leaves generally found at the base of each shoot, which are without buds in their axils, and will not put forth a shoot. These pinched shoots will soon put forth a fresh crop; every shoot of this second crop should be suffered to grow till it has made four or five leaves, and then be pinched to two leaves, and all succeeding crops of shoots must be pinched off to one leaf, as soon as four or five leaves are formed, unless larger and more spreading pyramids are desired. In such cases three or even five leaves may be pinched down to with advantage.

In the summer pinching of these pyramids it is good practice to pinch in all the shoots at the top of the tree a week or so before the lower shoots are operated upon, and to allow the lower shoots of all to grow at the end of the season, i.e. not to pinch them later than July. By the top shoots of the tree I mean those from the top to two feet down the stem.

If it be desirable to increase the height of the tree, the leading shoot at each pinching may be left with five or six leaves.

This incessant summer pinching of the shoots of a potted pyramidal tree, in the climate of the orchard-house, will, in one season, form a compact cypress-like tree, crowded with short fruit-spurs. In spring these, if too crowded, must be thinned out with a sharp penknife, so as to leave them as nearly as possible at regular distances, and shortened down to a leaf-bud or triple bud (either will do); and in summer the fruit should be thinned, and the shoots pinched in, as directed above, every season.

A close fruitful pyramid will thus be formed; on which the fruit will be fully exposed to the sun and air. A great number of trees may in this way be grown in a small space, three trees occupying the space required for one bush, and they will form beautiful objects of high culture.

It will be seen from what I have already said, that the pinching-in of pyramidal peach and nectarine trees differs slightly from that recommended for bush trees, in being more close. I must also recommend another slight variation, viz., instead of ceasing to pinch at the end of July, as with bush trees, pyramids may be operated upon till the middle or end of August. It is true that in the spring, when the blossom buds are swelling, many spurs will be found without leaf-buds, but these may all be cut out, and sufficient will be left. Unless late pinching is practised with these trees, they are apt to become too loose in their growth, and their side branches long and bare of shoots and buds.

Pyramidal peach and nectarine trees may be planted in the borders of orchard-houses, but in small span-roofed or lean-to houses, they are apt to disappoint the cultivator, for they *will* make such vigorous growth towards their tops, leaving their lower branches weakly and unfruitful.

I have tried annual removal, but in my stiff calcareous soil I found, after two or three years, that the trees did not thrive so well as those growing in the same house unremoved. In some soils it is quite probable trees would flourish under this annual removal, or at least annual root-pruning; but I find my unremoved trees, although too large and too vigorous for their present position in the borders of a small span-roofed house, yet bear fine crops, and although one sometimes thinks their strong shoots will break through the roof, they are beautiful objects, their shape being between pyramids and half-standards.

I have found by accident a method of checking their luxuriance, which seems against sound theory, yet it has done well for two seasons, and seems likely to continue to succeed. The following is the *modus operandi* of this rather eccentric method of pruning:—

In 1862, buds of some kinds of peaches and nectarines were much wanted for propagation. I therefore allowed some of the trees to make their first growth without being pinched; the shoots they made were most vigorous, many of them from four to five feet in length. About the middle of July these strong shoots were all cut off to within six inches of their base. The trees were loaded with fruit, and I thought that this sudden decapitation would put the crop in peril, and cause it either to cease to grow, or drop off in its then immature state. To my surprise, the fruit grew to its full size, and ripened well; the decapitated shoots put forth numerous young shoots, which on August 30 were pinched to within three and four leaves of their base; and the trees are healthy, promising, and capable of bearing good crops of fruit. I observe that their growth seems much more under control than those planted in the same border that have been under pinching all the summer. On the whole pot-culture, for pyramidal peaches and nectarines, is to be preferred.

MINIATURE PEACH, NECTARINE, AND APRICOT TREES.

THESE beautiful little trees are calculated to make a revolution in our desserts, so that it will ere long be thought a barbarism to serve peaches, nectarines, and apricots in dishes. They may be cultivated by summer pinching, in such small pots, that no inconvenience will be found in placing on each side of the plate of every guest a peach and a nectarine-tree, about nine inches high, with from three to five fruit on each. If the pots are covered and ornamented, nothing can be imagined more charming.

To form these miniature trees, they should be grafted on small plum-stocks (in 4-inch pots) of the kind known in nurseries as the Black Damask (Damas Noir of the French), in the month of January, and placed in a common garden-frame, heated gently by a hot-bed, or hot-water pipes. As soon as the young shoots have made four leaves, their ends should be pinched off, leaving three leaves, and all succeeding shoots pinched to one leaf. This summer pinching is never to be discontinued while the trees live, if it be intended to cultivate them as miniature trees. They should be shifted from the 4-inch pots they were in when grafted, to 6-inch pots in May, and to 8-inch pots about the middle of June. In these they must remain, without repotting, using the ordinary compost (always ramming it down firmly) of loam and manure for potting them, and the compost for top-dressing recommended in p. 60. The latter operation must be performed at the same season and in the same manner, by taking out the exhausted mould halfway down the pots, as directed for the large trees.

SELECTION OF VARIETIES.

The peach and nectarine season may be much prolonged by a judicious selection of varieties.

The earliest Peach is the Red Nutmeg, which will ripen in July (it is small, but very nice); next the Early Victoria and Early York, which ripen immediately after it; then the Acton Scot; the Early Grosse Mignonne; the Early Albert; the Grosse Mignonne; the Noblesse; the Royal George; the Galande; the Barrington; the Walburton Admirable, a most *admirable* sort; and the Late Admirable, of which the Teton de Vénus and Bourdin are excellent varieties: these ripen nearly in succession, are all melting peaches, and give their fruit from July till the middle of October. I am also inclined to think, that with the large 'Pavies' or Clingstone peaches of France, such as Pavie de Pompone, Catharine, and some new late varieties recently received from Georgia, U.S., the peach season may be prolonged till the middle or end of November.

A selection of Nectarines may include the following:—Elruge; Hardwicke Seedling; Rivers's Orange, very beautiful and very good; Violette Hâtive; Rivers's White; Roman; Early Newington; and Victoria, a very fine and rather late Nectarine.

CLINGSTONE PEACHES OR PAVIES.

A CLINGSTONE PEACH is generally looked at by English gardeners as a fruit of but little value, as something more akin to a turnip than a peach. They are not far from the mark, for a half-ripe pavie—a ripe one is rarely tasted in England—is a most unfruitlike production. In the warm districts of the United States the 'cling peach' is a very different fruit, and is reckoned by those who know peaches very well to be much superior in flavour to the melting sorts.

It seems to me that these late peaches deserve special cultivation by imitating, as far as we are able, the climate in which they arrive to perfection,—say that of Augusta, Georgia, U.S. For this purpose a house should be devoted to them, and the trees be suffered to bloom and set their fruit without fire-heat; but towards the end of July, gentle heat at night should be applied, the fire lighted at seven, and 'made up' at nine, so as to burn gently through the night; all through

August, September, and part of October, the ventilators should be open all day, and half of them all night, except the weather be very stormy, till the end of September, when less air should be given. We shall by this mode of culture imitate the warm autumnal nights of the Southern United States, and keep the fruit in a growing state till the ripening period arrives. In a common orchard-house without fire-heat, the cool nights in September seem to put the trees at rest, and the very late peaches, as I have experienced, do not ripen well. In the open air, on standards, the Early York peach ripens at Augusta the latter part of June, or a full month before it ripens here in a warm season on walls. The American peaches—Baldwin's Late, Pride of Autumn, Gaither's Late, and Mitchel's Mammoth—all ripen there the latter part of October; we may therefore expect them to ripen here, even in an orchard-house gently heated, towards the middle or end of November or even later; we may, perhaps, ultimately have ripe peaches at Christmas, for these late firm-fleshed sorts keep a long time after becoming ripe. In the south of France the late Clingstone peaches or pavies are cut in slices, and served at the dessert with wine and sugar.

Owing to the firmness of their flesh, they make excellent tarts or compotes.

SYRIAN NECTARINES.

THERE is a race of Nectarines from Syria well worthy of especial culture; the best of these are the Stanwick and seedlings raised from it. Many gardeners have failed in its culture, finding it crack, and drop off in stoning. It is easily cultivated in pots, but requires an orchard-house gently heated; the best of houses for the culture of this fine fruit is the small span-roofed with boards, and heated by one 4-inch hot-water pipe round the house. As soon as the trees are in blossom in April, the fire may be lighted every morning at six, and kept up till five in the afternoon all through May, giving abundance of air in the day, and a portion by night, although the crevices of the boards will admit some. In June and July the fire may be lighted at six in the morning, and suffered to go out at midday; the trees must be syringed regularly. By this treatment the fruit will ripen in the South of England in August, be clear, free from cracks, and the most perfect and delicious of all nectarines; its flavour is most peculiarly gratifying, and I have no hesitation in saying, that no fruit can be imagined more exquisite in flavour.

PLUMS.

The Plum is a charming fruit not yet half appreciated.

> **A rich green gage will soften a sage.**

It is in season from July to November: it is excellent for preserves and for compotes.* And then how delicious are many of its varieties as dessert fruit! For the orchard-house it is also well adapted; the early varieties ripen very early; the late kinds may be kept in muslin bags all through November; they shrivel in the dry climate, and are perfectly delicious. I have had some of Coe's Golden Drop in muslin bags on the trees, partaking of the flavour of those called 'French plums,' but richer and more agreeable.

Plums for potting may be grafted on the sloe (*Prunus spinosa*), but they are equally prolific when grafted on the plum-stock: if they have been removed the year previous to potting, they will be full of blossom-buds, and will bear a good crop the first season; if they can be procured already established in pots, the crop will be better and the fruit larger. The same compost and the same treatment recommended for apricots will do for plums; the same potting, pinching, and pruning, so as to make the trees nicely shaped, compact, and dwarf, is all that is necessary.

---

* French tarts, without top crust. Directions for making them are given in Appendix VI., p. 198.

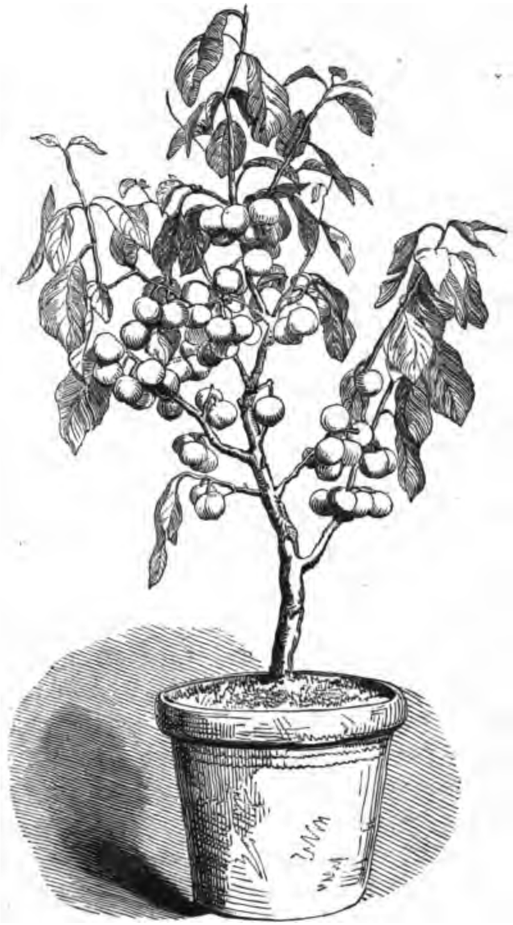
In selecting varieties some care is required, so as to have plums all through the summer and autumn. The very early and very late plums in the South of England seem to ripen in the orchard-house without any loss of flavour; but the mid-season plums—such as the Green Gage, De Montfort, and, I may add, the Jefferson—are, I think, improved in flavour by being ripened in the open air. About the end of June they should be removed to some warm and sheltered situation. Their flavour is, I think, made more piquant by this treatment; and their removal will give more room to the peaches and nectarines. In wet and moist climates, where the Green Gage ripens with difficulty, they must remain under glass all the summer.

And now to our selection. For the first, take the Early Favourite and Early Prolific, two most excellent sorts, which ripen about the middle of July, nearly as soon as the Jaune Hâtive, a very early but very inferior plum; next in succession come the De Montfort; the Denniston's Superb; and the July Green Gage; the Transparent Gage; the Green Gage; the Jefferson (rich and delicious it is); Purple Gage; Reine Claude de Bavay; Coe's Golden Drop; Ickworth Impératrice; Coe's Late Red, and the Late Black Orleans: all these are excellent, and ripen nearly in succession as I have placed them. A very nice way of keeping the autumn plums, or indeed those that ripen in summer, from wasps and flies, is to form the trees into compact bushes, which may be enclosed, when bearing fruit, in a muslin or tiffany bag, tying it tightly round the stem of the tree, so as to exclude the ants, which are great pests in dry and pleasant places. I have only to remark that the plum in orchard-houses will to a certainty always give abundant crops, and as certainly ripen its fruit: in short, its culture will be sure to give satisfaction to those who love gardening.

PLUM-TREE HOUSES.

After some years of experience, I have found the plum so easily grown in pots that I feel a new era in their cultivation has arrived. It is well known that plum-trees in our climate bloom so early in spring as to be much injured by our spring frosts; it may safely be asserted that a fair crop of Green Gages, away from walls, is realised but three years out of seven, even in the South of England, but two years out of seven in the Midland Counties, and seldom or never in Yorkshire. Now, I propose that, for those who wish to grow a regular and certain crop of plums without incurring a heavy expense, rough-built lean-to or boarded span-roofed orchard-houses should be erected in some out-of-the-way corner

FIG. 13.



Green Gage. 74 fruit.
(From a Photograph taken at Gishurst Cottage, Weybridge Heath.)

of the premises, consisting of larch-poles, rough half-inch boards with two or three sliding shutters for ventilation—in fact, merely a glass-roofed shed on purpose for protecting plum-trees in pots while in blossom and setting their fruit. It is surprising with what vigour and beauty plum-trees blossom even in the rudest glass structure; and as the trees need not remain in the house longer than the end of the first week in June—for then all danger of severe spring frosts is over—they may be placed so close together, that a house 20 feet by 12, with a path in its centre, will hold ninety-six trees, forty-eight on each border. The trees may be planted in 13- or 15-inch pots, and treated exactly as other orchard-house trees; with this difference—all the trees having young fruit should be removed from the house on June 7, and placed in rows or otherwise in the garden to ripen their fruit in the open air. The pots may be plunged in the soil one-third of their depth, but not more; for if the roots are too cold the fruit will suffer in flavour; and if the soil in which they are plunged be wet and cold, it should be drained or made porous, so that the water may pass from the pots rapidly: the top-dressing of manure must be most abundant. As a matter of course, the very late plums must be ripened under glass; but all those varieties that ripen in the open air before the beginning of September may be placed there to ripen their fruit, which they will do perfectly: regular annual crops may thus be insured, if care be taken to thin the fruit properly. If too large a crop be extorted, the tree *will* take a year's rest.

It is quite astonishing how prolific these bushes become in a few years; and, by merely pinching off the ends of all their shoots to three leaves, they soon form themselves into compact round-headed trees, quite as ornamental as orange-trees in pots and tubs, and far more gratifying as regards utility; for one would not like to place a dish of English oranges—cultivated as they have hitherto been—before one's friends, but English Green Gages are always acceptable.

The best varieties for this extended mode of plum cultivation in pots are—the Early Prolific; De Montfort; July Green Gage; Transparent Gage; Deniston's Superb; Green Gage; Angelina Burdett; Kirke's; Guthrie's Late Green; Reine Claude de Bavay; Purple Gage; and, above all, the Jefferson, one of the most beautiful and delicious of plums. These are for the dessert; but as in some climates it may be necessary to grow plums in the same way for culinary purposes, I may as well give the names of a few good kitchen plums: such are the Victoria and Autumn Compote, both large and excellent, ripening in succession; the Diamond; the Early Orleans; White Magnum Bonum; the Mirabelle; and Prince Englebert. The trees must all be removed to the orchard-house the last week in October, top-dressed, watered, some hay placed over them to protect their roots from frost, and then kept dry all the winter. As the earth of these out-of-doors orchard-house trees becomes very firm by the heavy rains of summer, the iron pick (fig. 9, p. 62), to take out the mould in spring, will be found very useful. I have given a sketch in p. 62 of one which I had made by the village smith. I may add that, as plums are coarse feeders, I take the surface earth out in autumn to the depth of 6 inches at the side of the pot, sloping upwards to the stem, so as to be able to give them a large quantity of fresh compost.

By those who wish to grow plums under glass in large quantities, another very simple mode of culture may be practised—viz., planting a house with pyramids or half-standards, and removing them biennially to check their growth. (Half-standard plum-trees are most prolific, and very convenient to manage.) One of our most skilful gardeners, Mr. Monroe, treats them in this manner, and finds that, after a few years, owing to the trees being every season loaded with fruit, they do not require removal, as they grow very slowly. When cultivated as pyramids in the orchard-house, they should be managed and pruned exactly as directed for apricots in p. 67; they should, however, be pinched to three leaves instead of five, as recommended for apricots; and when cultivated as bushes, summer pinching to three leaves will be found by far the best method of pruning.

CHERRIES.

THE Mahaleb Cherry (*Cerasus Mahaleb*), Bois de Sainte Lucie or Perfumed Cherry, has been long employed on the Continent as a stock for dwarf cherries; it will grow well in calcareous and shallow soils, unfavourable to the common cherry-stock. It is a very good stock for trees for potting; when grafted or budded on it, they form beautiful dwarf bushes: the May Duke and Morello cherries, of which there are several varieties, do much better on it than the Bigarreaus and Hearts, which are apt to gum, and grow too rapidly in proportion to the stock. Cherries are well known to be difficult to force, or to grow under glass. The blossoms generally fall without setting their fruit, but in our well-ventilated orchard-houses this is not the case.

Their potting, compost, and treatment may be exactly the same as that recommended for apricots: the trees should be formed into a nicely-shaped bush, with regular divergent branches; on each branch the shoots, all but one leader, must be pinched back in summer to three leaves, and the leading shoot shortened in August to about 6 inches, till the tree attains the size desired; the leader may then be shortened to 1 inch annually, and the branches thinned when they become too crowded. The best early cherries for the orchard-house are—the Empress Eugénie; the May Duke; the Archduke; the Belle de Choisy; the Royal Duke; and the New Royal, a very large and fine sort—which ripen in succession. Then of the Heart Cherries and Bigarreaus, the very earliest of all is the Early Purple Guigne; then the Belle d'Orléans; Early Red Bigarreau; Knight's Early Black; the Black Eagle; Elton; Bigarreau Napoléon; the Bigarreau; and the Florence. I have placed them as nearly as possible in the order of their ripening. Of late cherries of the Morello tribe, which succeed admirably as dwarf bushes, there are: Reine Hortense, a large and delicious sweet cherry; the Late Duke, also sweet, and of the highest excellence; Planchoury, Transparent, Coe's Late Carnation, a most delicious late cherry; Belle Magnifique, a very large Morello-like cherry, but not very acid; and the Morello, which, when fully ripe and black in September, is not to be despised as a dessert fruit. All these may be made to supply the dessert through August, September, and indeed great part of October, by enclosing each bush in a muslin bag, tied tightly round the stem near the ground: the dry air preserves them from mould, and the warm climate gives them a flavour very superior to that of late cherries matted up against walls, or indeed cultivated in any other mode. Cherries under glass are very liable to the attacks of the black aphis. There are two remedies for this pest: brushing the shoots with quassia-water; fumigating the house with tobacco-paper; or, when only a few trees are cultivated, covering the bush with a sheet of tiffany or calico, and placing ignited tobacco-paper in a small flower-pot under it, so that the draught through the aperture at bottom is open. This is a good method of fumigation.

CHERRY-TREE HOUSES.

In wooded districts it is almost impossible to taste cherries fully ripe, so numerous and destructive are birds: in such places cheap orchard-houses* might be built for their sole culture, in which the ventilators should be kept constantly open as soon as the fruit begins to colour, but the openings should be covered with netting to keep out their winged enemies. They grow remarkably well in pots, and in a few years become most fruitful, every spur giving a bunch of blossoms; nothing can be imagined more cheerful than a cherry orchard-house when the trees are in full bloom in April and May. Pyramidal cherries, either in pots, or, if planted in the borders of orchard-houses, removed biennially and pinched to three leaves—by which must be understood that every young shoot (all through the spring and summer), as soon as it has made four or five leaves, should be pinched to three—cannot be too highly recommended for orchard-house culture, for they soon grow into beautiful and fruitful trees. I scarcely know any fruit-tree more charming than a May Duke or Empress Eugénie cherry-tree, with its shoots pinched so as to form a compact pyramid, covered with fine ripe crimson fruit. Cherry-trees for *planting* in the borders of an orchard-house should be grafted on the Mahaleb cherry, as it gives them a dwarf prolific habit; none but those of the Duke and Morello tribes are adapted to this purpose. The Bigarreau and Heart cherries are so vigorous in their growth that pot-culture for them is absolutely necessary.*

---

* The small span-roofed house is to be preferred for a cherry-house, as fumigation, so often required for cherry-trees under glass, can be performed efficiently.

I may add that no description of orchard-house culture has given me more satisfaction than cherries in my cherry-house. I had fine ripe fruit of the Early Purple Guigne, on the 28th of May in 1864, and again in 1865, followed by early and late sorts, all through June, July, and August, thus giving this delicious fruit fully three months. If wasps abound in August, the trees should be enclosed in bags of tiffany.

My large pyramids of the Large Black Bigarreau and Black Tartarian cherries, covered with their fine fruit, have been for some years pictures of beauty.

---

* I have recently discovered that trees of these tribes of cherries when double-grafted on the May Duke or Morello become most prolific.

FIGS.

The Fig is not a general favourite; but to those who like them their cultivation in the orchard-house is interesting and most simple.

Figs may be planted in the compost already recommended, and in pots of the same size, top-dressed in spring, syringed in summer, and put to rest in autumn, and treated exactly as other orchard-house fruit-trees. Although fig-trees against walls require protection from the frost—which would otherwise destroy the young fruit which is the first to ripen in early summer—yet under glass, with the mould perfectly dry and the shoots thoroughly ripened, they are uninjured by the most severe cold. If a well-formed bush cannot be procured, the tree must be cut down the first season to within nine inches of its base; the shoots, when they make their appearance, thinned out to five: when these are about a foot in length, pinch off the end from four, leaving the central shoot for a fortnight or so to grow longer; then pinch off its end in the same manner. Your bush will be formed, but you must not expect any fruit the first season. In succeeding seasons it must be pruned in the same manner that you would a bearing tree purchased and placed at once in the house, i.e. in May or the beginning of June; as soon as the young shoots have made five leaves, pinch out the terminal bud of each: they will then give fruit for a second crop, the first crop having been produced by the shoots of the preceding year. And to keep your trees as compact bushes, as soon as a shoot has made five leaves pinch out the terminal bud with the nails of the finger and thumb. The tree will, in a few years, become too much crowded with young shoots; they must then be thinned out with a sharp knife, leaving no spurs, but cut close to the main branch or stem. Figs like more heat than any other fruit yet mentioned; they should have the warmest corner of the house, not requiring much ventilation. A house with fire-heat is indeed necessary for them if two crops in the season be wished for. In 1857, figs in common orchard-houses ripened two crops of fruit in several instances. They must have abundance of water, or the fruit will all drop when nearly fully-grown, without ripening. The varieties best adapted for pot-culture are—the Early Violet, the White Marseilles, and the Brown Turkey, or Lee's Perpetual: if more varieties be required, the Angélique and Black Ischia may be added.

In the fig-house of a neighbour, heated by hot water, the first-named sort has given three crops in one season, the last ripening in November. It is a small sort, not rich, but very nice. In common orchard-houses the second crop of figs is generally abundant; to insure its ripening, the tree should be removed to the forcing-house early in September, and have gentle heat to ripen the crop in October and November.

To those who have not much orchard-house room, the following method of growing figs may be useful. In the summer of 1857 I happened to visit Altenburg, a small town, the capital of the Duchy, about twenty miles from Leipsic. In the kitchen-garden of the castle I observed some fine half-standard fig-trees with very stout clear stems and round heads full of fruit, then (August) nearly full-grown. Aware of the coldness of the climate, the thermometer often descending many degrees below zero in winter, so as to kill fig-trees in the open air, I enquired of the gardener how they were managed. He stated that every season, in October, they were taken up with their balls of earth and placed in a cellar, where they remained till the first week in May: they were then brought into the kitchen-garden and planted in a row as I then saw them. He said they always ripened one abundant crop of fruit in September. I have reason to believe that standard figs treated in this way would also ripen one crop in the neighbourhood of London, so that every suburban garden may boast of its fig-tree in summer. In the eastern and southern counties they may be cultivated after this manner with a certainty of success.

PEARS.

In the South of England, pears can be grown on pyramids with so much success, 'barring' spring frosts, that there is no occasion to let them occupy room in the orchard-house; still, in seasons like that of 1850, when, in even the most favoured districts, all the blossom was destroyed by spring frosts, I felt much gratification in having about a dozen trees in pots, on quince-stocks, covered with fine fruit—and more highly flavoured Brown Beurrés I have never tasted. Their culture is very simple, for trees on quince-stocks that have been root-pruned may be potted any time in the autumn or even as late as February, and yet give a crop the first season after potting; as they set their fruit very thickly, they must be severely thinned the first season, and eight or ten pears ought to be the maximum of a crop. In two or three years a well-managed tree will be able to give from eighteen to two dozen finely-grown fruit. In the North this method of culture will be found both eligible and interesting; for glass without fire-heat will give just the climate suitable to the finer sorts of pears.

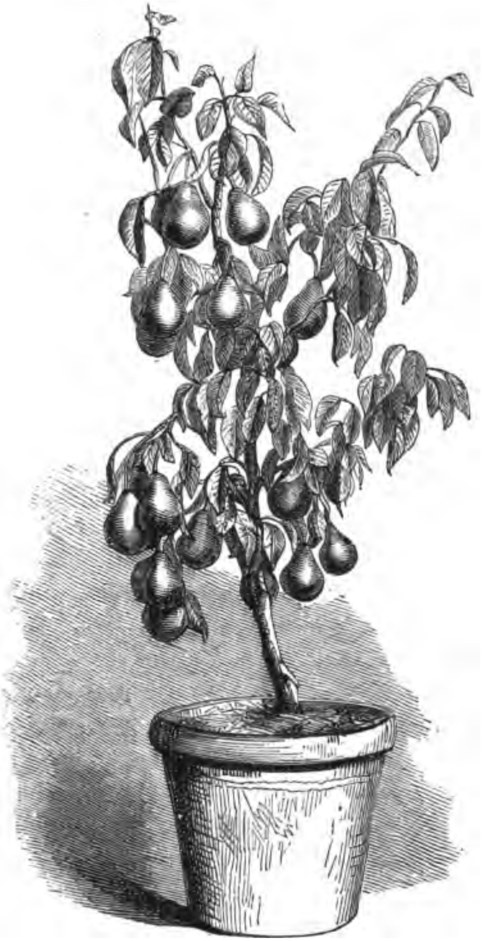
The pear-tree, when grafted on the quince, seems to be quite at home in a pot. I have some trees that have now been seven years in 13-inch pots; they are in the most perfect health, and the stock seems to swell with the graft, showing that existing circumstances are favourable to its growth. I am inclined to attribute this healthy state of the stock, and consequently of the tree, to the roots of the quince enjoying, if I may so express it, the warm atmosphere which surrounds the pots during the whole summer; for my trees have been placed, unplunged, out of doors in the sun. In warm dry soils, however, to economise water, it would be advisable to plunge the pots two-thirds of their depth in the soil. Pear-trees are gross feeders, and should have three or four surface-dressings of the usual surface-compost during the summer.

Further experience has shown that pears deserve to be grown extensively in orchard-houses; and in climates liable to spring frosts, or in gardens having but little space for the finer kinds of pears on walls, a pear-house may be built, as recommended for plums. The trees may be treated exactly in the same way, and abundant crops obtained. Pears ripened under glass require attention as to the proper time of gathering. They must not be suffered to hang too long; for in 1854, and again in 1855, in two or three instances, I had pears on my trees which were grown under glass all the season; these, although of fine size, and most beautiful in appearance, having clear skins of fine golden colour, without speck or blemish, never became soft. I was for some little time, I must confess, entirely at a loss to account for this curious fact, as all circumstances seemed so favourable to the ripening process; but I believe I have now discovered the cause. In the autumn of 1855 I allowed some Louise Bonne pears, some Passe Colmar, and a few other kinds, growing in the open air on trees well sheltered, so that no wind could displace them, to remain on the trees till the first week in November: they were remarkably beautiful, both in form and colour, and the fine dry weather we had for so long a period seemed so favourable that I felt unwilling to gather them; these pears never ripened. I am, therefore, led to conclude that pears under glass should be gathered early, i. e. as soon as they will part from their foot-stalks when lifted, which is generally about the middle of September. From not being disturbed by the wind when under glass, they will hang a long time, and one is loth to rob the trees of their ornaments: they thus become hard and worthless from a species of over-indulgence.

From recent experience, I am induced to recommend that in the South of England pear-trees should always be removed from the orchard-house in July, and suffered to ripen their fruit in the open air in a sheltered yet sunny situation; their flavour will then be piquant and racy—more so than that of fruit gathered from wall-trees.

The trees should be formed into bushes or pyramids, as recommended for apricots, plums,

Fig. 14.



Louise Bonne Pear. 18 fruit.
(From a Photograph taken at Gishurst Cottage, Weybridge Heath.)

&c.; all the young shoots should be pinched to three leaves in summer, so that the tree gradually but slowly increases in size, every part being furnished with blossom-buds. An abundant top-dressing of compost, as recommended for apricots, must be given in spring, even laid up above the rim of the pot; and such gross feeders are they, that manure-water may be given to them every day in hot weather in summer with advantage. The most prolific and eligible sorts for pot-culture are—the Beurré de Caen; Easter Beurré; Glou Morceau; Bergamotte d'Espéren; Beurré Superfin; Gansel's Bergamot; Doyenné Gris; Beurré d'Aremberg; Beurré de Rance; Louise Bonne; Marie Louise; Passe Colmar; Joséphine de Malines; Crassane; Winter Nelis; Thomson's; and Van Mons (Léon le Clerc). The above are all autumn and winter pears. If summer pears are desired, Doyenné d'Été, Jargonelle, Citron des Carmes, and Colmar d'Été may be potted. In the North, where these early varieties do not ripen kindly in the open air, their culture under glass will give much satisfaction, for they may be brought to the dessert with their fruit in full maturity. I need not, I trust, say more about this most interesting mode of cultivating pears. My readers will, I think, see its advantages, and many of them venture to put it into practice. If I lived in an unfavourable pear-climate, and wished for a certain supply of fine winter pears, I should fill a house with those two most delicious kinds, Joséphine de Malines and Winter Nelis, which, unlike some sorts, ripen under glass with their full flavour.

The Chaumontel pear is cultivated with great success by my friend Mr. G. H. Wilson, at Gishurst Cottage, Weybridge. He has for these two or three seasons past produced pears of this sort rivalling the fine Jersey pears—not quite so large, but covered with a cinnamon-coloured russet, and quite perfect in flavour. It occurs to me that this pear may be grown in orchard-houses with great success. Pear-trees should not be mixed with other orchard-house trees when the fruit is allowed to ripen in the house, but have a department to themselves, so that they may be abundantly syringed all through the month of August, which, with free ventilation, will give them that Jersey-like climate, humid and warm, which they seem to delight in. All kinds of pears, if kept under glass till they ripen, should be subjected to this treatment, and by this improved culture bushels of fine pears may be grown in trees in pots. In large orchard-houses 18-inch pots will be the best size for pear-trees, and in them large pyramidal and productive trees may be cultivated.

When cultivated as pyramids in the orchard-house, either planted out or in pots, they may be pinched as recommended for cherries (p. 103).

I have no hesitation in saying that choice pears might be cultivated after the following manner at a large profit. A rough but strong-built span-roofed house, 100 feet long and 24 feet wide, with boards for its sides and ends, and its roof only of glass, could be built for a small sum comparatively: a house of these dimensions would hold at least from 700 to 800 trees, in 13- and 15-inch pots, during the winter and spring months, till the first week in June, when their fruit would be set and safe from injury by the spring frosts. They might then be taken out, the pots plunged in some sheltered sunny situation, and the fruit suffered to ripen in the open air. By the end of October the trees should be top-dressed and returned to the house for the winter. The enormous quantity of pears that could be thus produced—for each tree in a year or two would give from three to four dozen—with the *certainty* of a crop, would be a source of great profit to a market-gardener.

Pear-trees treated in the way I have pointed out soon become remarkably fertile, owing to their roots being in a dry and warm climate all the autumn and winter.

GRAPES.

For some few years it has been the fashion for gardeners in lordly places to grow grape-vines in pots, which, after bearing one crop of fruit, have been destroyed. Now, these pots are generally of such large dimensions as to be quite out of character with our orchard-houses, and totally unfit for the amateur who wishes to be master 'of all he surveys.' By observing in the land of the vine that grapes, and good grapes, could be grown on very small bushes, and in crevices containing but a scanty portion of earth, I was induced to try their culture in comparatively small pots, without destroying them after giving their first produce, continuing their culture without shifting, but top-dressing them annually, suffering their roots to feed in the border during the summer, and then root-pruning and managing them in the same way as other orchard-house trees. This has succeeded admirably, and my vine-bushes have been beautiful objects, bearing from four to six bunches of nicely ripened grapes.

To form these bushes but little care is requisite; a vine one or two years from the eye, with a single stem, must be selected, and potted into an 11-inch pot in the same compost as recommended for other fruit-trees, adding to each pot a quart of 1-inch bones, well mixed with the mould; then cut the vine down to within eight buds of its base; the three lower buds must go for nought; the five upper buds, if the wood be well ripened, will give each a bunch. The lower shoots should be stopped, their tops pinched off as soon as they are 4 inches long: the upper five shoots may be suffered to grow till the bunch be perceptible; these may then be stopped one bud above the bunch, and all lateral shoots that afterwards come forth may be stopped at two buds from the base of the shoot they spring from. No other pruning will be required during the first season than this finger-and-thumb pruning. It is quite possible that some of the five buds may fail to give a bunch: no matter; stop them at the same length as the fruit-bearing shoots, so as to make a uniform pretty bush; for the vine in all sites and situations, and in all stages of its growth, is a beautiful object. You will now have an upright stem with five divergent branches or spurs. Now, on the pruning of these spurs depends success; they will of course, from being grown under glass, be well ripened, and the buds well developed. Begin at the stem, and count four or five buds upwards; the fourth or fifth will, in all probability, be nice and plump. This must be your fruit-bud. Cut down to it closely; then with a sharp penknife *cut out* two or three buds, leaving the terminal bud and another at the base of the spur close to the stem. This will give you a shoot which is to be your fruit-bearing shoot for the following year. You will thus have on each spur two buds, one for fruit and the other for wood.

In autumn that part of the spur which has borne fruit must be cut down close to the shoot which is to bear fruit the following season, and this shoot must be pruned in the same manner to one fruit-bud and one shoot-bud. This pruning should be done early in October, as the buds are then fully developed, and much is gained by autumnal pruning. A vine treated thus will last for many years, and may be always kept as a dwarf bush: the main stem, in time, will swell, and not require the support of a stick.

The first season the cultivator must be content with four or five bunches from the vine; but if the annual autumnal top-dressing of the composts described in p. 60 be given, and in summer a weekly supply of manure-water, it will soon be able to bear eight or ten bunches, and become like one of those hardy prolific bushes one often sees growing in the crevices of rocks in the wine-countries of Europe, which, in spite of the rough pruning they receive, always bear abundance of fruit.

An orchard-house bush-vine, in the hands of an unskilful cultivator, may also be roughly pruned without any fear of losing a crop:—Shorten every shoot in autumn to three buds; and in the course of time, when there is too great a crowd of stumps, thin them out. A fruitful bush will thus be formed, much like the stumpy vines in use in the wine-districts on the Continent.

After their fruit is set, vines require syringing like other orchard-house trees. As soon as the fruit is gathered, prune off the roots which have fed them so bountifully all the summer, top-dress them, withhold water, and put them to rest for the winter. I may add that vines do not need the extreme ventilation recommended for stone-fruits: a warm part of the orchard-house will suit them best; or if a small house with a brick Arnott stove can be entirely appropriated to them, so as to force them, and have two, or even three, crops in the season, their culture will be most interesting. Vines in general do not succeed so well when placed among peaches and nectarines as when they have a department or a house to themselves. They do not require so much syringing or so much ventilation; in short, they require and like a warmer climate than stone-fruits. To do this, if forcing be commenced in January, put in one-third of your plants, early in March another third, and then in May the remainder. I do not hesitate to say that a house appropriated to vines in pots will give more fruit than the same space of glass with vines trained to rafters in the usual manner.

The varieties best adapted for this bush-culture are those that are very prolific; none are more so than the following:—The Early Malingre; the Black Frontignan; the Prolific Sweet Water; the Esperione; the Grove End Sweet Water: the Cambridge Botanic Garden, a variety of the Black Prince, and a great bearer; the Muscat St. Laurent; the Royal Muscadine; the White Romain; the Black Hamburg; the Violet Chasselas; and the Chaptal, which gives large and most beautiful bunches. It must not be forgotten that the berries must all be thinned when they have attained the size of small peas, or they will become crowded and inferior.

VINES IN POTS ON HOT-WATER PIPES.

It is a fact generally known, that vines in pots can be cultivated more successfully when placed on a warm surface than on a cool one; but I have no recollection of ever having seen stated the amount of heat their room would bear. Wishing to test this, I was induced in January 1864 to try the rather hazardous experiment of placing some vines, forty in number, on a very hot place—the upper, or flow, 4-inch pipe used with others to heat a newly-constructed orange-house. I was encouraged to do this from recollecting a vivid description given me by a travelled friend of the luxuriance of vines he had seen growing and bearing fine fruit in mere crevices of the rocks in some of the islands in the Grecian Archipelago—more particularly, I think, in Paros.

He seemed to think that some of these vines had not more earth to grow in than one of our moderate-sized flower-pots would hold, and the heat he described as perfectly scorching: yet the vines flourished and produced magnificent fruit. Be it as it may, my vines were placed in a row on the hot-water pipe, which I found reached a temperature varying from 130° to 150° and upwards; they were mostly in small (9-inch) pots, for I confess I only anticipated obtaining one or two bunches from each vine, merely to test the quality of their fruit, as they were new kinds. Each pot was supported by a piece of copper wire brought round it under the rim, and twisted round a nail driven into the wooden plate supporting the house, and the vines trained under the roof. Some of the earth was removed from each pot to about two inches in depth, and replaced with a compost, firmly rammed down, of horse-droppings and malt-dust saturated with liquid manure. The vines broke freely, showing one or two bunches at every bud; they ripened their fruit in May and June; it was of the most perfect flavour ever tasted, and the colour of the Frontignans and Muscats was of a beautifully bright amber. The vines, when it was seen that they would do well, were assisted with fresh compost by sticking pieces of slates round the pots, inside, to support it; they were watered twice or thrice a day, and obtained a vigour seldom or never seen with vines in such small pots: they were at the end of August growing vigorously, some of them having shoots which amounted in the aggregate to 40 feet. None of the roots were scorched, not even those that were coiled round the bottom of the pots. The exquisite flavour and beauty of the fruit was doubtless owing to the pots being on so hot a place, and also being fully exposed to the sun-heated air (often 95°) of the house. To keep down red spiders, the vines were syringed twice a day, avoiding the fruit.

As this mode of growing grapes is perfectly sound, and no fear need be entertained of failure, such small pots as I commenced with should not be used, but 12- or 13- or 15-inch pots may be employed, and every spare 4-inch hot-water pipe may have its row of vines placed on it if any room can be found to train them. The rich surface-dressing above-mentioned should be renewed two or three times during the growing period.

The great contrast between growing grapes in pots on hot-water pipes, every part of the pot exposed to a fierce dry heat, and growing them in large pots plunged in tan or some other moisture-giving material, will be apparent to all grape-growers: by the latter method, large bunches and berries of mediocre flavour may be obtained; by the former, berries and bunches equally large, with the highest possible flavour. Moreover, the vines ripen their shoots so thoroughly, that they may be fruited several years in succession, merely by repotting them in the autumn, but when this is done, care should be taken in pruning not to root in the spurs very close.

I have only to add, that I have again this season (1865) tried the experiment with vines in 13-inch pots with perfect success, one vine—the Muscat Hamburg—showing 30 bunches, which it promises to bring to perfection, from having, I presume, been assisted with abundant surface-dressings of horse-droppings and malt-dust, which its roots, coming as it seems instinctively to the surface, seem to feed upon lustily.

A VINEYARD UNDER GLASS.

Some years ago I was much struck with the vines in the gardens of the South of France, trained to upright stakes about 6 feet high, which, as my visits were made towards the end of autumn, I saw season after season loaded with fruit. They were pruned on the spur-system, somewhat after the manner of pruning now practised in our vineries, but not so close. I then planted some in a border at the back of a lean-to house with a beech hedge for its back wall, to try if it were possible to grow grapes after the same fashion under glass. They grew and bore well, but the hedge-house, I found, was too cold to ripen their fruit in all seasons; so they were taken up, and in the hurry of business the idea passed from my mind, and the experiment was not carried out fully.

I can now however, with the improvement

that has taken place in building orchard-houses, safely recommend this very interesting mode of grape-culture in one of my small span-roofed houses 14 feet wide and 18 inches of glass in each side, as described in p. 17, one of which I have now planted with vines trained to stakes.

A house of this width and 30 feet long will hold 12 vines trained under the roof in the usual way, up one side and down the other. If, however, the vines are planted in the borders, and trained to upright iron rods 6 and 7 feet in height and at 30 inches apart, which will be found the proper distance, it will hold 48 vines planted in two rows: one row to be within 2 feet of the side, and trained to 6-feet rods; the other 4 feet from it next to the central path, and trained to 7-feet rods. Each border will thus serve for 24 vines. They should be pinched in summer and pruned in autumn, in the same manner as directed for bush-vines in pots (p. 118); or if the minutiæ of this mode of pruning be irksome to the amateur, he has merely when pruning in October to cut the shoot down to two eyes, not leaving more than two stumps (the pruned shoots) to each joint. The vine will have these all up the stem, at intervals of about 6 inches. I may mention that but little pruning science is required. I have a row of vines in the open air growing in a sandy soil, which, with the rough pruning they receive from one of my labourers (as I merely give directions to prune the stout well-ripened shoots to two eyes, and cut off close to the stem all that are weak or not ripe), never fail to bear every year most abundantly.

It is good practice to detach all the vines from their rods in the month of March, and lay them flat on the ground till the young shoots are 1 inch in length; they will then break with more vigour in the lower part of the stem.

It may be questioned if the vines will bear fruit from 'top to toe.' Perhaps the lower part of the stem may fail; still, if each vine gives fruit on only two-thirds of its height, the produce will, I doubt not, be much heavier than from vines trained under the roof in the same space. Twelve roof-vines may give 20 bunches each, or 240 in all—a most abundant crop. Forty-eight vines trained to rods may give, at 12 bunches each (a low estimate), 576 bunches, or an increase on roof-cultivation of nearly 100 per cent. There is besides this the pleasure of walking among one's vines, and of being able to train and prune and thin the bunches and berries without having the eyes strained by constantly looking upwards to the roof. The borders these upright vines are planted in should be well forked over to a depth of 20 inches, and be enriched with a dressing of manure, half-inch bones, and lime-rubbish well mixed with the soil in stirring it. It may be advisable to annually root-prune and dress the vines after the manner of the Zante vineyards, as mentioned in

p. 191; but this must be a matter of experiment, to be carried out by the zealous amateur. I can imagine but few things more agreeable than walking in a vineyard under glass while the vines are in bloom and in fruit.

There is yet another mode of growing vines under glass which may be practised, instead of training them as pyramids—to make them into half-standards, with heads like other fruit-trees: these may be pinched in summer, and pruned in winter, so as to form round fruitful heads; or they may be trained over a wire-frame, so as to be ornamental as well as useful. Half-standard vines may be occasionally seen in gardens in France, in districts where the climate is warm enough to ripen the fruit, and a charming effect they have when loaded with their pendent purple bunches.

Strong-growing and good bearing sorts should be chosen for this kind of culture, such as Black Hamburg, Trentham Black, Black Prince, Chaptal, Chasselas Vibert, Royal Muscadine, Muscat de Sarbelle, Muscat St. Laurent, &c.

The 14-feet wide span-roofed orchard-house seems to me the most eligible and agreeable of all for a vineyard under glass. It should stand endwise, north-east and south-west, so that the sun may shine all the morning on the south-east side, down the middle about one o'clock, and on the north-west side all the afternoon. This description of house appears much more agreeable than the span-roofed houses without sides recently patented by Sir J. Paxton, and can be built at a smaller cost than one of those 'hothouses for the million' recently advertised. Judging from the figures given, these are like the 'ten-pound vineries' invented by Mr. R. Warner, of Broomfield; and as vineries for the roof-culture of grapes, they will be undoubtedly useful, but they have not sufficient head-room for orchard-houses.

APPLES.

THERE are a few delicious American apples which require more sun and a drier climate than our 'tight little island' can boast, and these may be cultivated in the orchard-house with success. They should be grafted on the Paradise stock, be planted in the same-sized pots as other orchard-house trees, in the same compost, and have the same treatment recommended for apricots with regard to summer pinching both as pyramids and bushes. The only sorts I know at present worth this trouble in the south of England are some foreign varieties, among which are the following sorts of American apples: the Newtown Pippin; the Northern Spy, a delicious, large, handsome, and good keeping apple, with half-melting flesh; the Mother Apple; the Reinette du Canada; the Fall Pippin; the Primate; the Summer Queen;

and the Melon Apple. These seem to require a warmer climate than the open air even of our southern counties. The Mela Carla, a favourite Italian apple, may also be tried. In the far North, however, some of our fine English apples may be equally worthy of a place under glass: such as the Ripstone Pippin; Cox's Orange Pippin; the Nonpareil; the Golden Pippin; the Golden Reinette; the Van Mons Reinette; Coe's Golden Drop; the Sturmer Pippin, and some others.

Apples grafted on the French Paradise stock will one day be cultivated to a large extent in orchard-houses. This stock is too tender to bear the open air in England, unless the soil and site be very warm; but apples grafted on it, and grown in pots under glass, form the most charming little *buissons* imaginable, the warm air of the house suiting well both stock and graft. An apple-tree house will soon be thought indispensable in the extreme north, and I hope one day to see orchard-houses on many a sunny slope in the Highlands; and why not? If art and wealth can overcome nature in making fruits grow instead of heather, the conquest will cause smiles rather than tears, and give a much greater amount of happiness than the 'glorious victories' of our history.

MULBERRIES.

In many gardens this delicious fruit does not ripen kindly; in such localities dwarf trees, in pots, in a few years bear well, and ripen their fruit in great perfection.

I have this day (July 25, 1865) gathered ripe fruit of our common Black Mulberry, quite ripe and rich and sweet beyond any I have ever tasted, so that mulberry culture in orchard-houses is *un fait accompli.*

I may also add that White Currants, which are seldom well ripened, and even then are very acid, may be grown to great perfection in pots under glass.

STRAWBERRIES.

On the back border of the lean-to orchard-house —for, unless the front be partially of glass, the front border will be too much shaded—spaces will be found for strawberries in pots, and they give much pleasure and satisfaction; their fruit will ripen about ten days before those from plants in the open air, and to a certainty will not be spoiled by rain or vermin. Whoever has tasted fruit of the 'British Queen,' grown under glass without being forced, will, I am sure have a lively recollection of their being much higher-flavoured than those generally gathered from strawberry-beds.

Nothing in our orchard-house culture is so simple as the management of potted strawberries, and nothing will be so certain of agreeable results. About the middle of July take 6-inch pots (32's of the London potteries); place two or three large pieces of broken pots at the bottom, so as to lie hollow; then mix your compost, which should be two-thirds loam—if rather stiff, the better—and one-third rotten manure. You are so far prepared for operating, but you still lack an implement; and what a strange one in the hands of a gardener! for it is neither more nor less than a pestle—a wooden pestle, fashioned out of any stout stake, and perfectly rounded at bottom: now then take a handful of mould—nothing like the hand in potting—put it into your pot, and give it a good pounding, and so keep on with a handful and a pounding till your pot is full, quite level with the brim, for the earth will afterwards sink enough to retain water. You will thus, if you have done well, make your earth level with the brim, and as hard as a barn-floor. Take the pots to your strawberry-beds (and mind, there are but few strawberries known at present to be worth forcing or growing in pots in the orchard-house; Keen's Seedling and the Seedling Eliza for early sorts, and the British Queen and Carolina Superba for a main crop, will suffice), and place on the centre of each pot a runner which has commenced to make roots) or if no roots be apparent it will do as well) and on the runner place a small stone, to keep it from being blown off by the wind. Make no hollow place: do nothing but place it on the hard surface as I have directed. If the weather be dry, water daily; and if the runner, as is often the case, pushes forth another runner, pinch it off. In two or three weeks the roots will have penetrated to the bottom of the pot: the plant may remain attached to its parent till the middle of September, and then all the pots may be removed to their winter quarters—some sunny place: they should be placed on rough cinders, and then plunged in sawdust or rotten tan. In February they may be removed to the orchard-house or forcing-house, as required—no shifting is requisite—and a plentiful crop will be the result.

Strawberry plants, treated in this manner, attain much strength and luxuriance in the autumn; their fruit-buds will be finely developed, and they will be all that the gardener can wish them to be. This very simple mode of treating strawberries for culture under glass is not new; it was pointed out to me by a market-gardener some years ago. I have practised it ever since, and am more than ever pleased with it. In growing strawberries in pots, it is the usual practice to place them on shelves close to the glass. In the orchard-house at Hyde Hall, I have seen, annually, remarkably fine crops; the pots are placed among the peach-trees on the back border, 6 feet from the glass.

The following extract from the 'Gardener's Chronicle' of June 7, 1856, seems to give a very nice mode of cultivating strawberries in pots :—

'In the garden of the Horticultural Society, in the year 1855, Mr. Gordon caused runners to be taken up from the ordinary plants in the open borders in the first week in August, and potted in 2½-inch pots (small 60's); the soil used was a mixture of rotten cowdung and loam (quarter dung, three-quarters loam). When potted, they were placed in a close frame until established, and when the roots had filled the little pots, which was in about four or five weeks, the plants were shifted, in the same kind of soil as before, into 4-inch fruiting-pots (48's). They were afterwards transferred to a fully-exposed situation in the open air, where they remained until the first week in December, at which time they were removed to a border in an unheated orchard-house, where they were kept rather dry during winter. On the 14th of March the pots were removed to the front shelf in a curvilinear vinery, kept at a temperature of 40° until the middle of April, when the temperature was raised to 55°. The plants were watered twice, when the fruit was fairly set, at an interval of three days, with a weak liquid manure, made with half-rotted cowdung and water, allowed to stand a few days before using. The result was an abundant crop of excellent fruit.'

ALMONDS.

To those who wish to be reminded of the 'sweet south,' by having almonds fresh and ripe from the tree, the orchard-house will give one more tribute. Almond-trees in pots require exactly the same treatment as peaches and nectarines, but the choice of the proper sorts is of consequence. The Sweet Almond in common cultivation, and which is so conspicuous in our shrubberies in March, with its bright pink blossoms, is not the variety to be selected. The only sorts worthy of cultivation are the tender-shelled Almond ('Amande à coque tendre') and the Large-fruited Almond ('Amande à très-gros Fruit'): the former has shells very tender, and easily broken with the fingers; the latter gives large fruit, with shells not quite so tender. They require, however, even more air than peaches while in bloom; and if the weather be dry and sunny, they should be placed in the open air by day, removing them to the house at night: if this be inconvenient, they should be placed near one of the ventilators, which should be open night and day.

THE FORCING ORCHARD-HOUSE.

This kind of fruit-house may be built in the same way as the common orchard-house; but it is necessary to nail felt over the boards to prevent its being too airy in early spring, when forcing is commenced. It requires skill and attention; still, with only common care, a house heated by a brick Arnott stove placed in the centre, or by hot-water pipes, will not disappoint the careful amateur gardener, and will give strawberries in March, grapes in May, and peaches and nectarines in June.

I have a house 30 feet long, with a brick Arnott stove in the centre of the back border, which is excavated for it. Everything thrives admirably. My forced strawberries, placed on the front border near the glass, root into it, and give me abundance of excellent fruit. In like manner peaches, grapes, figs, and apricots may be forced with but little trouble—in fact, with much pleasure and gratification. The three modes of heating are by a well-built flue, the brick Arnott stove, and hot-water pipes: the first and second are about equal as regards economy; the last the most expensive, but certainly more agreeable than any other. A flue may be employed for houses under 50 feet in length, and 12 or 14 feet wide, efficiently; but not, I think, for houses above that length. Any country bricklayer can build one: its dimensions inside should be 9 inches deep, and 6 inches wide, formed by bricks on edge, covered with two layers of tiles. The furnace should be fixed low, so that there is an immediate ascent from the end of the furnace into the flue; and a gentle rise—3 inches in 20 feet—should continue to the chimney, which may be of less diameter than the flue with advantage, according to some gardeners; it is not, however, of much importance. In building these *forcing* orchard-houses, the *constant* ventilation through the cracks in the boards must be avoided, or too much heat is lost: the boards must be rebated or be cased with asphalte felt; or, as bricks are cheap, the walls may be of brick, with the ventilating shutters in back and front. The forcing orchard-house I have alluded to above is built with posts of larch cut once down, and covered with half-inch boards; these, being nailed on, were well tarred with Stockholm tar, and the felt (M'Neil's) then nailed on, and done over twice or thrice with boiling coal-tar, in which lime that had been slaked a fortnight was mixed to the consistency of thick paint: this has formed a shining imperishable mineral coat. I know of nothing equal to it for felt, clay, or lime walls or fences.

I have said that bricks may be used; and to those who build on their own freehold, and like substantial buildings, they are preferable; but although I have many plant-houses built with bricks, I have not employed them in orchard-houses, or even houses for forcing roses, &c. My preference for boards covered with felt for forcing-houses may be owing to imagination; but I may as well state *why* I have preferred and still prefer them. It is because I have found them fiercely hot during the day, even in moderate sunshine) the effects of which are easily modified by abundant ventilation), and agreeably cool during the night, without that stifling atmosphere peculiar to houses with brick walls only, because bricks give out heat for many hours after sunset. Now, in thus rapidly cooling down, they certainly approximate to the descriptions given of the climate of the East, the birthplace of all our choice fruits; and so my peaches, nectarines, grapes, and figs grow and do well in houses with their walls of ½-inch boards and felt.

To show how unnecessary it is always to abide by fixed rules, I must however give my experience with a small span-roofed house boarded at the sides (the boards not rebated, and so there are crevices), fitted with hot-water pipes, two flow and two return.

I commenced forcing peaches and apricots in this house about the middle of January. I could always feel small streamlets of air making their way into it from each side, but as the hot-water pipes are there, these small currents of air were warmed in their passage over them; and the house being by these crevices so well ventilated, I had no occasion to open the shutters till late in March, in hot sunshine, when the fruit was set and swelling fast, and every tree in health. In severe weather in February the fire was kept up with more care, just to keep the thermometer up to 35°; so that in a house of this kind, when forcing is not commenced *very* early, a little more fuel, owing to loss of heat by the crevices in the boards, will remove a world of anxiety about giving air.

Forcing of peaches and nectarines in pots, unless the fruit be required to ripen very early, i.e. in April or early in May, is not a difficult operation. The trees should be removed from the orchard-house to the forcing-house in December,* and towards the end of the month have a good supply of water, so as to thoroughly moisten the earth; if severe frost comes on, a fire should be lighted at night to keep the earth in the pots from being frozen. About the middle of January forcing may be commenced, the temperature by day kept up to 50° by fire-heat (if the sun shines it will mount up to 60° or 70° for a short time without injury to the trees), the night temperature may go down to 40°. The trees should be syringed twice a day with tepid water—this will soon make the blossom-buds swell: and when they are fully open, which will be in about twelve days, discontinue syringing; and if the weather be mild and sunny, give air very freely in the day, and a little by night, so that no stagnant moist air, so fatal to the blossoms of the peach, may exist in the house. If the weather be keen and frosty, air must still be admitted, and a brisker fire kept up, so that the temperature may not be lower than 50° by day and 36° by night. Close worsted nettings, or Haythorn's hexagon netting, placed over the ventilators inside, will allow of a small quantity of air being given night and day, even in frosty weather, without injury to the blossoms. As soon as the fruit is set and begins to swell, syringing twice a day with tepid water may commence; a day temperature of 60° and a night of 40° to 45° should be kept up; and when sunny, abundance of air may be given, for the thermometer will then rise to 80° and 90°. Instead of lowering the fire, which may lead to inconvenience, admit more air to lower the temperature, for gleams of sunshine in our early spring months are not of long duration, and the temperature is completely at command by the ventilators. To sum up, give brisk fire-heat and abundance of air by day; very little fire-heat, or none if the weather be warm, and a slight portion of air by night: syringe twice a day—in the morning at 9, in the afternoon at 4—till the fruit commences to colour, and peaches and nectarines will ripen kindly early in June, and be of fine flavour.

---

* If potted in autumn for the purpose of forcing, or shifted into larger pots, the pots should be plunged in a gentle hot-bed in the open air till the end of December.

Apricots, May Duke cherries, and plums may also be forced; and although in large establishments the two former often have houses especially allotted to them, as they require much care to fully succeed, yet a few trees placed near the ventilators,—for they require even more air than peaches and nectarines—may do very well with them. It is a good practice to thin out the clusters of blossoms on the May Duke cherries with sharp-pointed scissors before they open, taking out quite half from each cluster.

FORCING WITH ROOT-HEAT.

The most efficient method of forcing peaches and nectarines, and also grapes in pots, is to give them root-heat, forming a hot-air chamber by enclosing two 4-inch hot-water pipes between two 4-inch brick walls, and then placing bars either of iron or wood across from wall to wall: on these should be placed slates; the heat from the hot-water pipes thus enclosed, will give a surface constantly heated; on this flooring of slates the pots should be placed, not plunged in any material, for if so the air of the house will not be heated sufficiently. So favourable is this root-heat to the growth of trees in pots, that I have found vines in pots placed on the brickwork over a boiler, with a surface heated to 130°, make shoots 20 feet in length, and bear very fine fruit. In a house 12 or 14 feet wide, with two 4-inch pipes going round it, the path should be in the centre, and a bed or hot-air chamber, 5 to 6 feet wide, on each side; the pipes should be near the ground, but not resting on it, and the brickwork may be from 20 to 24 inches in height. This method will answer well for moderate forcing, so as to have peaches ripe in June; but if early forcing is practised there should be two 4-inch hot-water pipes above the hot-air chamber, so as to fill the house with warm air. This extra heat may, however, be dispensed with, if a house is double-glazed, which, as compared with a house single-glazed or heated with the same apparatus, will give an increase of from 10 to 12 degrees of heat: for example, a house heated with two 4-inch pipes round it in cold weather in spring may, with a single roof of glass, have a temperature of 60°, but with a double roof, and with the same heating force, it would have a temperature of 72°. This is an enormous gain, and the construction of such roofs for early forcing will ere long be very general.

I am indebted to Thomas Bewley, Esq., of Blackrock Park, near Dublin, for the following description of one of his double-roofed houses:—

'The roof only is double; the inner glass, common 21-oz.; the outer, thick rough plate: the inner is glazed and, as usual, fixed; the outer is all in separate sashes, which rest on the rafters from centre to centre, and hold by a neat screw at bottom; thus any one can be taken off at any time, and the surface of the glass cleaned. The space between the outer and inner glass is from 4 to 5 inches, and in this space is motionless air, which acts as a blanket. The only heating to this house is a pair of 4-inch hot-water pipes running round it, a good deal covered up with rockwork.

'If such a house were glazed in the usual way, I do not think I could do more than exclude frost during severe cold; whereas now I can easily maintain 46° in very severe frost, and 48° to 54° in cold weather. The house is for stove-plants, with merely the heating power of a common greenhouse; and, unless the weather be unusually dull and cool, no fire is required from May till October. During the remainder of the year not more than one-half the usual heating power is required—and this is a house for tropical ferns. I think the annual saving in firing and attendance is fully equal to 20 or 25 per cent.; against this, we have the double cost for a roof and increased painting and breakage; but, on the other hand, we should take into account the extraordinary health and vigorous growth of the plants, and consequently their increased value.'

For very early forcing these double-roofed houses will be excellently adapted, and the lean-to form the most economical. Although for a fernery the rough plate-glass for the outer roof may be more eligible, I should prefer for fruit-forcing good 21-oz. glass for both roofs, as a clear light is of so much consequence in winter and early spring.

THE HEDGE ORCHARD-HOUSE.

Some thirty years since I planted numerous beech hedges for shelter, standing with their ends SE. and NW. A few years ago their SW. sides looked such compact green walls, 8 feet high, that I was tempted to rear against them four lean-to houses, each 40 feet long and 12 feet wide, 8 feet high at back, and 3 feet high at front, with a sunken path in the centre. The climate in these houses in the summer months is most delightful. Tea-scented roses, magnolias, and other shrubs liable to injury from our severe winters, thrive admirably, owing to the dryness of the soil and air. Apricots and peaches ripen about three weeks or a month later than those on walls; but, owing to the quantity of cold air admitted through the back hedge in spring, their blossoms often suffer in April, if frosts be severe. I found this to be the case in April 1854 and 1855; this induced me to build some small span-roofed houses, 12 and 14 feet wide, 4 feet high at the sides, and, instead of using boards, to plant hedges to form the walls—one of yew, the other of Siberian arbor-vitæ. These are clipped twice in the growing season; they now form compact hedges, and seem to flourish all the better for the drip from the glass, which pours into them when it rains heavily.

The proper dimensions for one of these span-roofed houses should be—height at sides, 5 feet; height to ridge, 9 feet; width, 14 feet. Yews or arbor-vitæs may be used for hedges, as they seem equally adapted to bear the drip from the roof. The appearance of these verdant walls, when nicely clipped, is quite enjoyable.

I mention these span-roofed hedge-houses, not only because their climate in spring, summer, and autumn is most charming, and perfect as a promenade for persons in delicate health, but for their convenience in retarding fruits. The trees bloom ten or twelve days later than those in the regular orchard-house, and generally escape injury from spring frosts; there is such a constant percolation of air through the hedges when the sun shines, that the healthy growth is surprising. If Royal George and Noblesse peaches are to be retarded, they may be removed from the boarded orchard-house to the span-roofed hedge-house from the first week in June till August; they will ripen about three weeks later than those left in it. Apricots, plums, and pears ripen well in these houses, and are always perfect in flavour; cherries are liable to be eaten by birds which creep through the hedges. The great charm of them is their perfect ventilation without any trouble. For many kinds of green-house plants they will be found the best of summer quarters; the increased temperature in sunny weather, from 15° to 20° above the open air, and the absence of heavy storms, which so often injure exotics when placed out of doors in summer, are most advantageous to their well-doing.

THE TROPICAL ORCHARD-HOUSE.

An orchard-house for tropical fruits has long been with me a favourite idea, and recently, my daughter having returned after residing two years in the island of Grenada, it has received a fresh stimulus. The variety of tropical fruits there seems almost endless; some of them, if I may judge from description, are too rich, others too insipid, for English palates, and of the greater part the trees that bear them would require a house far beyond the means of the amateur not blessed with a large fortune. I will therefore, for the present, confine myself to a tropical orchard-house for fruit-trees of moderate growth; not extravagant in its dimensions, and yet capable of giving many luxuries.

The small span-roofed house, with some little modification, described in p. 17, seems best adapted for this purpose. Its sides should be 5 feet in height, 3 feet of which should be 9-inch brickwork, and 2 feet (the upper part) of glass; with sashes 2 feet long, on pivots or hinges, at intervals of 5 feet, for ventilation in hot weather. It should be glazed with double crown-glass, which is very clear, and rarely gives occasion to scorching. Its height should be 10 feet, the path 2½ feet wide, and the borders on each side 4½ feet wide, raised with brickwork to 16 inches in height. In the centre of each border two 4-inch hot-water pipes should be laid, and then a flooring of slates laid across from wall to wall of each bed, so as to leave a space for a hot-air chamber; 6 inches of the brickwork must be carried up above the slates, so as to form a hollow bed with 6-inch edgings to support the mould, which must rest on the slates to form the perpetual hot-bed on which the pots are to stand. The compost for this border should be two parts turfy sandy loam, as lumpy as possible, one part rotten dung, and one part bricks broken into small pieces, from the size of a nut to that of a walnut, with their dust; these should be mixed with the above, to keep it open and favourable for drainage, and a border of mould made with it on the slates, four or five inches in depth. A perpetual hot-bed is thus formed. So far this is a safe and necessary step; but the hot-bed will not heat the air of the house sufficiently in the damp and chilly days of winter. This must be done by two 4-inch hot-water pipes carried round both sides of the house, next to the walls, just above the surface of the borders.* The atmosphere of a house thus heated should range, in spring, summer, and autumn, from 70° to 90° (the latter only in sunny weather); and from 60° to 70° in winter, i.e. from the end of November till the middle of February.

It is well known that orange-trees, cultivated in the usual way in France or England, never give fruit at all eatable, solely from the lack of heat at their ripening period late in autumn and winter. In Grenada (West Indies) they commence to ripen towards the end of October, in a temperature varying from 70° to 80° or thereabouts; their flavour there, freshly gathered from the trees, is so delicious that they are far superior to those we receive from St. Michael's and other places, all of which are gathered before they are ripe. In our tropical orchard-house oranges ripen in October, November, and December. How agreeable to be able to gather a portion of the Christmas dessert from one's own trees!

The orange will, I have no doubt, form a distinguished feature in this mode of fruit-culture; I will, therefore, commence with directions for its cultivation. As an ornamental tree in the green-house and conservatory, it is an old friend; and perhaps no tree in the known world has suffered, and does suffer, such vicissitudes, yet living and seeming to thrive under them. It *glories* in a tropical climate, and yet *lives* and *grows* after being poked into those cellar-like vaults used for its winter quarters on the Continent; it gives flowers in abundance under such treatment, and would even give its fruit—albeit uneatable—if permitted. Nearly the same kind of cultivation has been followed for very many years in England; it has rarely had heat sufficient to keep the tree in full vigour; and its roots, in pots or tubs, must have suffered severely from having been placed out of doors in summer on our cool damp soil, and in winter on a stone floor still more cold. If roots could make their complaints audible, what moanings should we hear in our orangeries all the winter!

---

* Saddle boilers of a large size are most efficient for the high temperature required in the tropical orchard-house: they have very great power.

In cultivating the orange for its fruit, the first consideration is to procure some of the most desirable varieties; such as the delicious thin and smooth-rinded oranges which we receive from St. Michael's, the Maltese Blood orange, and the Tangierine.

The Tangierine is of all oranges the most desirable, as it is a most abundant bearer, and produces fruit of as fine a flavour in the orchard-house as at Lisbon. It requires, however, different treatment from that of the usual orchard-house trees; for, although comparatively hardy, it must have the shelter of a green-house or conservatory during the year, so as to be protected from summer rains and the winter's frost.

There are two methods of cultivating this most charming fruit, the Tangierine orange. The first and the most eligible is by forcing, so as to have the fruit ripe in October: if properly treated they will then be in the highest perfection, their skins bursting with their delicious juice. To carry out this mode of culture, the trees should be removed to the pinery or vinery, where early grapes are being forced, early in the month of January; the pots plunged in gentle heat in the high temperature of such houses. They will blossom towards the end of February, and should be treated as all other kinds of fruit-trees are when in bloom—i.e., the pots and the lower branches may be syringed, but the blossoms kept dry. They will set large crops of fruit, which, if too much crowded, should be thinned. If possible, the pots should be kept plunged, or stand on a heated surface all the summer in the temperature of the pinery or forcing vinery; they will then ripen their fruit early in autumn, when oranges are rare. This mode of culture is practised with great success by J. Stoveld, Esq., of Stedham Hall, Midhurst. The sort is a great bearer. A friend writing from Alexandria, Egypt, tells me that trees not more than 6 feet high have often given him a crop of 500 fruit each.

The other method is to keep the trees in the green-house or conservatory all through the winter, and remove them to the orchard-house in May; they will blossom in May, and set their fruit, which will increase in size slowly all the summer, but not ripen till the following year, in June or July. The trees should be removed from the orchard- to the green-house the end of September. This is not so satisfactory a method of growing this very pretty nice fruit as the former, but the trees in bloom and in fruit in May are most interesting objects in the orchard-house.

In the course of a few years every well-appointed garden will have its Tangierine orange-house; the trees planted in the borders of a 14-feet span-roofed house, the borders heated with hot-water pipes, and the air with hot-water pipes above the surface, would be both fruitful and beautiful at all seasons. Their habit is dwarf, and yet graceful, from the smallness of their leaves. They seldom, even in the orange-gardens of Portugal, attain a greater height than from 5 to 7 feet. This delicious little orange is only eaten in perfection when fresh from the tree. In Lisbon it is sent to the dessert in clusters with leaves attached to them; unless these are quite fresh and green when the fruit is served, it is not reckoned in full flavour. If grown in the tropical orchard-house, the trees should be placed in the coolest part of it, and have abundance of air in mild weather in winter: they will then bloom later, and set their fruit with greater certainty.

The St. Michael's orange is well known for its thin rind and excellent flavour. A very superior sort, which I received direct from St. Michael's, seems to be a most prolific variety, for trees only one foot in height are full of blossoms and fruit. The treatment recommended for the culture of the Tangierine orange may be followed in cultivating this sort. The day is not far distant when we shall walk in orange-groves in England; for Tangierine and St. Michael's orange-trees, planted in the borders of a large span-roofed house, furnished with enough of a heating apparatus to keep out frost, and the borders heated as before mentioned, will grow well and bear well; so that it is quite probable our markets will be supplied in the autumn with Tangierine oranges freshly gathered from the trees, and full of the delicious aroma they are renowned for.

There are several kinds of oranges cultivated in the Azores besides that thin-rinded excellent sort known *par excellence* as the St. Michael's. The following kinds I have recently received, and give their descriptions:—The Egg orange, oval, very handsome and delicious; the Plata, or Silver orange, very delicious; the White orange, with white flesh, very juicy and sweet; the Persian lime, perfume most agreeable, with a fine aroma, and sweet and juicy; the Sweet lemon, rind thick, flavour sweet and agreeable.

The Maltese Blood oranges are of two kinds, the oval and the round: they are equally good. The trees are not so prolific as the two kinds above mentioned, and seem to rejoice in a warm atmosphere; so that the pinery or vinery, or some house with a high temperature, must be their home. My trees are thriving vigorously in a house heated gently, and kept moist by syringing twice a day.

There are also some sweet oranges cultivated in France, of which trees could be readily introduced; but the first-named varieties seem to me most worthy of the careful cultivation to be given them in the tropical orchard-house.

The first matter of import is the soil best adapted for the orange. There are many receipts given in our gardening books, but the most simple compost of all, and one that cannot fail, is the following:— Two parts sandy loam, from the surface of some pasture or heathy common, chopped up with its turf, and used with its lumps of turf about the size of large walnuts, and its fine mould the result of chopping, all mixed together; one part rotten manure at least a year old; and one part leaf-mould. To a bushel of this compost add a quarter of a peck of silver-sand or any coarse siliceous sand (calcareous sand and road-sand are injurious); and the mixture will do for all the fruit-trees of the tropical orchard-house, as well as for oranges. In potting the orange, it is better to commence with a pot too small rather than too large, for, unlike the peach or the plum, it does not feed rapidly and at once fill the pot with roots. Thus a tree two or three years old may be potted in a 9-inch pot, suffered to remain for one year, and then removed to a 13-inch pot perforated as for other orchard-house trees, in which it may remain (unless the house be very large, and a large tree be wished for) six, seven, or ten years. A portion of the surface-soil should be annually removed early in February, as directed for other orchard-house trees, but not deeper than from 3 to 4 inches, and the pots filled up with the above compost; and about the beginning of March a surface-dressing of the compost described at p. 60 should be given. I have observed that the French cultivators strew fresh sheep's manure on the surface; they also place their trees in a pure peat earth. I have not seen this mode of culture in England, but it may be tried where peat is abundant. Two other surface-dressings of the compost should be given—one in June, the other in the beginning of September. The trees will, of course, be placed on the hot-bed, or plunged slightly two or three inches into the mould. I am not, however, an advocate for plunging to any extent, unless very rapid growth be required; for I find that trees in pots, standing *on* a bed of heated mould and rooting into it, make a healthier although a slower growth.

As soon as the fruit is gathered, which ought to be by the beginning of February,* when foreign oranges commence to be good, the trees should be lifted and root-pruned as directed for peaches, and top-dressed.

Orange-trees cultivated in the tropical orchard-house should have a part of the house to themselves, divided by a light glass partition, as they require and will bear more ventilation than other tropical fruit-bearing trees. Thus both borders of the small span-roofed house should be appropriated to them, the other part of the house being occupied with mixed trees and shrubs. Air can then be given to them by opening the sashes on one or both sides, without interfering with trees and shrubs requiring less ventilation.

Orange-trees, when grown constantly under glass, are liable to a black fungus on the upper surface of the leaves; this can only be removed with a sponge and warm water. They should be syringed with soft tepid water twice a day (at 9 A.M. and 5 P.M.) during the summer, and once a day in the morning, in sunny weather, in early spring and autumn; while the fruit is ripening in the winter, syringing should be discontinued. It is the custom to cultivate orange-trees in square boxes made of oak. I am inclined, however, to recommend pots perforated at bottom, as usual with other pots used for orchard-house trees: the slate pots made by the late Mr. Beck, of Isleworth, are very neat and even ornamental; with the usual five or seven perforations, they would doubtless answer very well. If wooden boxes be used, they should have bars at the bottom, to allow the roots to make their way into the hot-bed.

---

* I have departed from this rule by allowing fruits of the Maltese and St. Michael's to remain on the trees till June this present year (1865); they were then perfectly delicious.

The Mangosteen (*Garcinia mangostana*).—There are, it is said, many kinds of this 'most delicious of all fruits,' varying in size, flavour, and fertility. Penang and Singapore are, according to report, the only places in which it is brought to perfection; the communication with these places is now much quickened by the overland route and steamers. Young trees of some of the most prolific varieties should be imported, and also abundance of young trees of some of the more common kinds, to be used as stocks for grafting, which, as is well known, often induces a tree to bear fruit. By these means fruit-bearing mangosteen-trees will soon cease to be rarities, and we may even live to see Covent Garden supplied with this rare fruit home-grown. The trees should be planted in the pots usually employed for orchard-house trees, and suffered to root into the hot-bed of mould on which they are placed: if they are inclined to grow too vigorously, they should be kept in check by lifting the pots; and when the fruit is gathered, root-pruning and top-dressing in the usual way should be attended to. In short, to prevent repetition, the treatment recommended for orange-trees will, as far as I can see, answer for all other tropical orchard-house trees.

The 'Chirimoya' (Anona cherimolia).—In our estimation this is the Mangosteen of South America. A recent traveller in Peru (Markham) describes it as resembling 'spiritualised strawberries and cream.' It is said to attain its greatest perfection at Caraccas, owing probably to peculiarity of climate, as is the case with the mangosteen at Singapore and Penang. If there be any superior varieties in existence they should be sought for at Caraccas; and when tropical orchard-houses are established, a consignment of Wardian cases filled with young trees from La Guayra (which is only about twenty miles from Caraccas, thus giving but trifling land-carriage), will, I have no doubt, be a safe venture.

The Pomegranate (Punica granatum).—Although this tree does not in general bloom and bear fruit under glass, treated as it is in France and England, I am inclined to think that, like orange-trees, it will succeed in the tropical orchard-house. There is a large-fruited sort from Malta, and a seedless variety, both of them worthy of a trial.

The Lee-Chee (*Euphoria litchi*).—This, even when brought over from China in a half-dried state, is, as I can testify, a delicious fruit; when fresh from the tree, it is said by those who have visited China to be most refreshing and excellent.

The Loquat (*Eriobotrya japonica*).—This is also a Chinese fruit, which will ripen in the tropical orchard-house in winter, and is therefore desirable; trees grafted on the common whitethorn will come into bearing more quickly than those reared from cuttings, layers, or seeds. The late Lord Bagot, according to Loudon, used to grow this fruit in great perfection at Blithefield: its flavour is mild and agreeable, something like a medlar.

The Guava (*Psidium Cattleyanum*).—This is the most prolific of the guavas, and bears most abundantly; its flavour is peculiar, and does not at first please all palates, but it is quite worthy of cultivation. There are also the Spice Guava, the size and shape of a lemon, with a white interior and a clove-like flavour; and the Large Yellow Guava, its inside red; both of them esteemed in Grenada, an island remarkable for the great variety of its tropical fruits.

The Granadilla (*Passiflora*).—There are many varieties of this fruit, varying in flavour, size, and colour, so that it is difficult to point out the best for our purpose. To some persons their flavour is most agreeable, to others the contrary. I suspect this must be partly owing to the variation of flavour in different sorts. Markham speaks of the Peruvian Granadilla as being delicious. My daughter from Grenada mentions the 'Water Lemon,' a variety of the Granadilla, the size of a hen's egg, and full of a most refreshing juice, as a delicious fruit. They are all climbers, and should have a frame of iron wire placed in the pot to train them to.

The Mango (*Mangifera indica*).—There are numerous varieties of this fruit in India, more particularly in Java: some of the most free-bearing varieties should be imported, as it is likely to prove a valuable fruit-tree for this species of culture. The late T. A. Knight cultivated mangoes with great success at Downton Castle. They were thought superior to the best Eastern mangoes, being free from turpentine flavour. Mr. Ivison, the skilful cultivator of tropical fruits at Sion House, is of opinion that the mango may be easily cultivated, as it does not require so high a temperature as many other tropical trees.

The Dwarf Plantain (*Musa Cavendishii*).—This fine and most prolific fruit-bearing plant will not group well with our other tropical trees and bushes, but a place should be found for it at the warm end of the house near the boiler. As it is a gross feeder, it must have a larger pot than ordinary; one from 16 to 18 inches in depth, and the same in diameter, will not be too large: such a pot will require at least seven apertures at bottom for the emission of roots. This plantain, however, roots so strongly, that care must be taken to lift the pot at least once a fortnight, and rather to give it fortnightly surface-dressings of manure than suffer its roots to spread too far—in short, to feed it from above rather than from below.

The Rose Apple (*Jambosa vulgaris*).—According to Loudon, in his 'Encyclopædia of Gardening,' this is an agreeable tropical fruit, 'about the size of a hen's egg, rose-coloured and white-fleshed, with the flavour of a ripe apricot,' ripening in December. Mr. Cattley used to have this at his famous hothouses in Hertfordshire, of which now scarcely a vestige remains, and had great success in its culture, as his trees yielded regularly abundance of fruit. Mr. Ivison thinks this tree also will prove useful.

The Sweet Lime is a variety of the genus *Citrus*, the size and shape of a full-sized nectarine, with a thin and fragrant rind of a pale yellow; its flavour is like that of a very superior orange, with a delicious aroma, and so wholesome and refreshing is it that 'from twelve to eighteen may be eaten at once with pleasure and without injury to health.' The tree is very prolific, and bears its beautiful fruit in clusters of ten and fifteen each; this is a fruit highly esteemed in Grenada.

The Sapodilla (*a variety of Achras Sapota*) is also a Grenadan fruit; it is the size and shape of a large lemon, with a brown rough coat, and a luscious juicy pulp, in which a few black seeds are imbedded; it is commonly eaten with a spoon, and is in great estimation.

The Mangaba (*Hancornia speciosa*), a Brazilian fruit growing plentifully near Pernambuco, a small tree with drooping branches resembling the Weeping Birch, must be introduced, as it will undoubtedly do well in a tropical orchard-house.

The Marangaba (*Psidium pygmæum of Arrudo*), a shrub from 1 to 2 feet high, the fruit about the size of a large gooseberry, with a delicious flavour resembling that of the strawberry, is also a desirable Brazilian fruit.

The Nabuzeiro (*Spondias tuberosa*), a fruit about twice the size of a large gooseberry, of a yellowish colour; when ripe it has a juicy pulp under its coriaceous skin, of a pleasant sweetish-acid taste. Like the mangabas, it is only fit to eat when it is so ripe as to fall to the ground.

A variety of the Mangaba (*Hancornia pubescens*), growing near Natividado, has fruit nearly twice the size of that growing so abundantly near Pernambuco, and is even more delicious.

The Jabuticaba (*Eugenia cauliflora*) grows wild in the woods in the south of Brazil, and is also cultivated. It is of a black colour, and about the size of a greengage plum, of a pulpy consistence, and very refreshing.

The late Dr. Gardner, in his 'Travels in Brazil,' mentions all these fruits with the descriptions I have given.

Kidder also found a fruit near San Paulo, called *Jaboticabeira,* perhaps the *Jabuticaba*—a fruit like a large purple grape, growing from the trunk and branches of the tree, and highly delicious.

The Fig.—This may be made a most desirable tropical orchard-house tree, and so managed as to give its quota to the Christmas dessert. Trees of one or two years old, that have been protected from the winter in a cold pit, should be potted early in May into 13-inch pots, and protected from our usual May frosts by being placed in the orchard-house, or any cold frame or pit, till the first week in June. They may then be placed out of doors for the summer in a sunny exposure, sheltered from boisterous winds. Liquid manure may be given to them once a week, and they should be lifted once a fortnight, to prevent the roots, which would make their way through the bottom of the pot, from becoming too large. They may remain in their summer quarters till the end of September; but if one or two of our early autumnal frosts occur in that month, they should be protected by having a piece of calico or a little hay thrown over them. At the end of the month they will be covered with young green figs, and if removed to the tropical orchard-house they will ripen their fruit towards the end of November and through December. If it be wished to retard the ripening of the fruit on some of the trees, they may be placed in the common orchard-house or a cold pit till the first week in November. They will then, on being removed to the tropical orchard-house, mature their fruit even as late as January. The most prolific and best varieties for winter figs are the White Ischia (this is sometimes called, incorrectly, the Nerii, and is a most abundant bearer); the Brown Turkey, or, as it is often called, Lee's Perpetual; and the White Marseilles.

I have in these few pages given the outline of what may be done towards increasing our garden luxuries. The culture of tropical fruits is not a new idea; but I have endeavoured to give a new version of an old idea. There is now no occasion for the bark-bed, in which it was once thought necessary to plunge the pots containing the plants of all tropical fruits. A perpetual hot-bed on which to place the trees—which may or may not be a new invention—is now easily formed by hot-water pipes; and I well know, and again say, that a tree standing *on* a hot-bed will make a healthier although slower growth than one that is plunged *into* a bark-bed. Moreover, the latter is always disagreeable from its requiring to be turned and renewed, as well as from its unpleasant smell.

It will be seen that I have confined myself to the description of a comparatively small tropical orchard-house; this I have done that I might be consistent. Large gardens have, for the most part, good gardeners, who know how to build houses, if the means be provided, much better than I can tell them; but when the system of culture is understood, I can see no reason why large span-roofed houses should not be built, even in gardens of moderate size. The great object is to have abundance of heat at command: the central border, therefore, in a large span-roofed house, would require four 4-inch hot-water pipes, each side border two; and to heat the air would require four 4-inch hot-water pipes round the sides. In such a house the trees might be suffered to grow to a goodly size, and would give a great abundance of tropical fruits, from the delicious little Lee-Chee to the exquisite freshly gathered Maltese orange.

I have been content with the enumeration and description of only a few tropical fruits: when their culture is better understood the list may be extended; for in all tropical climates there are numerous fruit-bearing trees and bushes utterly unknown to English gardens. It may perhaps be said that some of the kinds of fruit I have recommended will form trees too large for a house of the dimensions given: this ought not to influence the cultivator, for, as is well known, the fig grows into a very large tree when the soil and climate are favourable, and yet bears well in a pot of moderate size. Collectors have, for many years past, paid much more attention to orchids and pines than to tropical fruits, only because the culture of these has not been carried on in England with spirit. Let us hope that, owing to the introduction of hot water as a means of heating, the low price of glass, bricks, and timber, we shall see tropical orchard-houses rising up, and rivalling the now numerous orchard-houses in their agreeable productions.

HOW TO FORM AN ORANGE-GROVE.

THERE appears something bordering on romance when one talks of an orange-grove in England, yet it is quite feasible. One day, ere long, orange-groves under glass, giving fruit and flowers and a perfumed promenade more agreeable than the dusty surface of the ground under a plantation of orange-trees in the countries where they are cultivated for their fruit, will be common enough in England, when the method of making one is pointed out. There are two modes of forming a plantation of orange-trees under glass: one is simply to keep the temperature in winter from sinking below 30°; this may be done by having, in a large span-roofed house 24 feet wide, three 4-inch hot-water pipes all round the house. In a house of this size, and thus heated, a central path, four feet wide or more, should be formed, and the border on each side planted with Tangierine, St. Michael's, and any other kind of orange that is not too robust and vigorous in its habit. Citrons, lemons, and shaddocks should not be mixed with oranges in planting, but have a portion of the house devoted to them, or they will soon shade the more humble-growing kinds. Tangierine, St. Michael's, or other kinds of oranges of moderate growth, may be planted about five feet apart, and the borders in which they are planted, if not loamy or clayey, but light and sandy (for the orange likes a stiff soil when growing *au naturel*), should have a dressing of stiff yellowish loam and rotten manure—two-thirds of the former to one of the latter, and six inches thick; this should be forked over and mixed with the soil to eighteen inches in depth, and you will then have a border in which orange-trees will grow freely and bear abundantly.

A large span-roofed house 100 feet long and 24 feet wide would form a grove large enough for a most enjoyable promenade. An amateur living near Clapham, Surrey, has recently built three houses of this size, one of which may probably be formed into the first orange-grove ever seen near London. There is another mode of forming an orange-grove under glass, more expensive and luxurious, by adopting 'geothermal culture,' and heating the borders as well as the air of the house. A house 24 feet wide, under this system, would require four 4-inch hot-water pipes under each border (with rubble

4 inches deep over them), placed about 2 feet under the surface; with a path in the centre of the house 5 feet wide; each border may be from 9 to 10 feet wide; the pipes about 2 feet apart; besides these, there must be four 4-inch hot-water pipes to heat the air of the house in the ripening season. In a house thus heated, those delicious (when first gathered) Maltese Blood oranges may be grown, and the Pernambuco and other tropical varieties of the genus *Citrus*. Tangierine and St. Michael's orange-trees planted in these warm borders would ripen their fruit very early, and it would be sugary and rich. There seems, indeed, no end to what can be done by Englishmen with the aid of artificial heat and glass. What a beautiful vineyard under glass could be formed by such heated borders as I have described above! and how charming 'to make a promenade,' as our neighbours say, in such a place! The beauty and interest attached to an orange-house, when the trees are kept in fine health, I can testify to in all sincerity. My house is an unfailing source of pleasure. A large house—a real orange-grove—would be a realisation of the gardens of the Hesperides. The trees evergreen, almost ever-blooming, seem to be an ever-giving source of delight to a mind alive to the beauties of Nature!

INSECTS,

AND HOW TO DESTROY THEM.

Numerous species of aphides, under the name of 'blight,' are, as is well known, most troublesome enemies to all fruit-trees in the open air, and orchard-house trees are not exempt from their visitations. Each species of fruit-tree seems to have its peculiar aphis. There are, however, two which attack the peach and nectarine: the Brown Aphis, which often makes its appearance on the young shoots and buds in November and December; and the Green, which generally attacks the trees as soon as the fruit is set and the young leaves unfolded. These are easily destroyed with quassia-water, made by boiling one ounce of quassia-chips in a quart of soft water ten minutes, and dissolving in it, while cooling, one ounce of soft soap, and applying it, when cool, with a middle-sized painter's brush, in the following manner:—With the left hand place a piece of slate or glass against the shoot, so that it may rest against it, and then dip the brush in the water and brush upwards: if the first application does not kill them, it must be repeated.

This will destroy all the tribe, even the hard-to-be-killed Blue Aphis peculiar to the plum, and the Black which so often infests the cherry.

The best of all modes of destroying them in small houses, or those of moderate dimensions, is, however, by fumigation, when a large number of trees are infested, or when the aphides make their appearance on the young shoots just before or while the trees are in bloom, making the application of quassia-water hazardous. This is best done in the evening, and most economically with tobacco-paper.* The house should be shut up, and two or three (or more, according to the size of the house) 8-inch flower-pots, with large burning wood-embers at the bottom, placed on a tripod, or on two or three stones, so that there be a draught through the bottom, and then filled with the paper. The next morning the trees (if the fruit be set, otherwise not) should be syringed with all the force possible, by applying the syringe close to each. Another mode of fumigation (and this is convenient when only a tree or two are infested) is to envelope the tree in tiffany or thin calico, and then place under the covering a small pot of ignited tobacco-paper. In all cases the dead and dying insects should be washed off with the syringe.

In the orchard-house culture of peaches and nectarines, syringing must play an important part; for the Red Spider is so fond of their leaves, that, like Sinbad's Old Man of the Sea, he will stick closely, and cannot be dislodged without applying the syringe close to the under-surface of them. If this pest be suffered to make the least progress, the flavour of the fruit will be entirely destroyed. A small pocket lens, in the hands of the amateur, will be the best instrument to discern it: looking closely at the under-surface of the leaves, if it be there, a small bright-red speck, like a red grain of sand, will be seen. The experienced gardener does not look for them. One glance at the upper surface of those leaves which show some minute yellowish specks is quite enough for him. If, therefore, the least sign be apparent, continue the regular syringing, even till the fruit be ripe; otherwise syringing may be discontinued when the peaches and nectarines commence to soften, preparatory to ripening.

---

* The 'medicated tobacco paper,' sold by Griffiths and Avis, of Coventry, I have found most efficient.

A very excellent mode of using sulphur has been given in the 'Gardener's Chronicle' (No. 1, 1858, p. 5), by Mr. Gardener, of Rossall Hall, Fleetwood:—'The house being shut up quite close in the evening, some large flower-pots (say 13-inch pots) were half-filled with fresh unslaked lime: this was moistened with about six quarts of water, and a handful of flowers of sulphur strewed over it, and suffered to remain all night.* The next morning the house was syringed most abundantly.' This will destroy not only the red spider, but also the mildew on vines, and is, in my opinion, one of the best of remedies. As prevention is better than cure, I advise all lovers of orchard-houses and vineries to apply it once a week through June and July. I am inclined to think that this simple remedy will do away with the necessity of the constant syringing I have recommended, and if so the fruit will be improved in flavour. It is, at any rate, worthy of a trial.

---

* In the fifth edition, the word 'sprinkled' was used instead of 'moistened'; and too large a 'handful' of sulphur has been in some instances applied, from which some mischief has occurred. One ounce of flowers of sulphur is the proper quantity. One 13-inch pot, which holds nearly a peck of lime, will suffice for a house 20 feet × 14.

Orange-trees are subject to that obstinate and hard-to-kill pest, the Brown Scale, in size and shape like the scale of a small fish. This generally attaches itself to the young shoots, the under-surface and the footstalks of the leaves. Fumigation will not kill it. The best remedy is to brush it off with a stiff brush dipped in a mixture of soft soap and tobacco—four ounces of the former and two ounces of the latter infused in a quart of boiling water, or four ounces of Gishurst Compound dissolved in a quart of soft water.

MONTHLY CALENDAR,

FOR THE MANAGEMENT OF

THE ORCHARD-HOUSE THROUGHOUT THE YEAR.

JANUARY.

OBSERVE the same rules for protection against frost, and give water, if necessary, as directed for December. In bright sunny weather the ventilators may be opened, to lower the temperature and prevent the blossom-buds from swelling prematurely.

FEBRUARY.

Continue the same rule for ventilation and protection as directed for December: towards the end remove the trees to their summer stations (see page 57).

MARCH.

Early in the month all the trees should be pruned, according to the directions given under each kind of fruit. Water may now be commenced, unless the frost be very severe, giving two quarts to each tree, and gradually saturating the earth.

If the weather be sunny, with sharp frosty nights, the shutters, both back and front, may be open from 9 A.M. to 4 P.M., and closed at night. If the weather be cloudy, with frost, the shutters should be closed night and day. Apricots will sometimes bloom in the middle of this month, before the other trees. If the frosts be severe at night, it will be well to throw a piece of tiffany over such as are in bloom, removing it in the morning; this is so light that the blossoms will not be injured.

APRIL.

Observe the same regulations as in March, as to ventilation. In the beginning of the month the trees will in most seasons be in full bloom. In sites near the sea, or in valleys where the air is damp, it will much facilitate the setting of the fruit if a camel's-hair pencil be passed lightly over the anthers and stigmas when the trees are in full bloom, so as to disperse the pollen which sometimes becomes glued to the anthers, and does not lodge on the stigmas as it should do. When this is the case, the blossoms drop off without setting their fruit. I give my trees a sharp rap with a stout stick every day while they are in bloom. If severe frosts come on, which is sometimes the case, and the thermometer in the open air descends to 28° in the evening, a fire, consisting of six or eight quarts of charcoal, should be placed in an iron pan in the centre of the house: for a house 30 feet long and 14 feet wide, one pan will do; for one 100 feet long, three pans will be required. Whenever charcoal is burnt, the ventilators over the door or doors in span-roofed houses should be left open. Watering the trees thoroughly while they are in bloom (see p. 57) is of great consequence: the fruit often drops off if the earth, which has been drying ever since November, is not soaked through and through.

Towards the end of the month, when the fruit is set and commences to swell, syringe the trees* morning and evening with soft water, or spring water that has been exposed to the air for a few hours. Place the syringe close to the under-surface of the leaves. If the weather be dry and warm, the trees may be watered in the evening. The aphides will now begin to make their appearance. Their destruction must be seen to, as directed in p. 167.

MAY.

Observe the same regulations as to watering and syringing the leaves as in April. Ventilation must now be strictly attended to: in all descriptions of weather the ventilators must be open by day from 8 A.M. to 6 P.M.; but if the situation of the house be exposed, so that the NE. wind can blow through it, it will be as well not to open the ventilators that will admit that or the E. wind when it blows fiercely. Worsted netting, with meshes just large enough to admit the point of the finger, is a most excellent material to place over the ventilating openings inside, to remain all the summer. It softens the violence of a brisk gale, and yet admits plenty of air. It will be found most useful near large smoky towns, for the fibres of the worsted meet in the meshes and keep out sooty particles: insects also never attempt to enter. A clever orchard-house cultivator, living at Bow, near London, has found this worsted netting of great value; for his orchard-house trees are as green and as fresh in summer as if they were in the country instead of being in the midst of smoke. Aphides will now be very active, and must be destroyed. Apricots will also be infested with a caterpillar in their young shoots: the ends of them must be pinched, so as to crush it. If trees, either bushes or pyramids, are to be under summer pinching* only, it may be commenced early in the month, as soon as the young shoots have made five or six leaves (see pp. 55, 67, 77, 87). Fig. 15 is a shoot in a fit state for pinching, to be pinched at *a*.

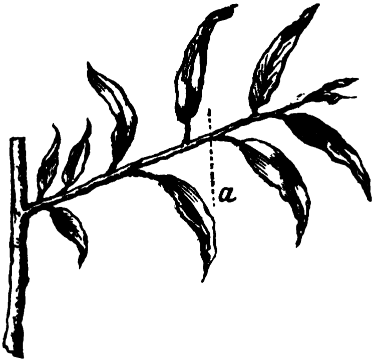
---

* The 'Hydropult,' sold in Cheapside, London, is a capital syringing instrument—the best ever invented.

---

* Although the word 'pinching' is used, a penknife, to cut off the ends of the young shoots, is usually necessary.

Fig. 15.



June.

Syringing at 7 A.M. and 6 P.M. must now be strictly attended to, except with cherries and apricots, which will require it but once a week; and if the weather be hot and dry, the trees will require watering abundantly every evening. My trees in 13-inch pots and seven years old take one gallon each. All the ventilators should be open from 8 A.M. till 6 P.M. Some fresh surface-dressing of the usual compost may now be added, if the surface of the earth in the pots be hard and close.

Commence to thin the fruit, and pinch in the laterals, as directed in p. 65, particularly of figs.

The red spider now requires particular attention, and the pocket lens must be brought into use: if syringing fails to completely extirpate it, lime and sulphur (as in p. 169), must be resorted to. Remove plum-trees to the open air, to ripen their fruit, if there be a scarcity of room in the house; also apricot-trees.

On the 10th, and again on the 25th, lift the pots to break off the roots, and prevent them going too deeply into the border (see p. 80).

Summer pinching of pyramids and bushes to be attended to.

In this month chlorosis, or the 'yellows,' will affect fruit-trees in pots. This is sometimes caused by stagnated water, and sometimes by the stock the tree is grafted on. In such cases the tree should be placed on bricks to assist the drainage, and watered twice a week, for a fortnight or more, with an infusion of sulphate of iron—1 oz. to a pint of water, which should then be mixed with five gallons, and two quarts given to a tree at each watering.

JULY.

Thorough ventilation must be attended to; it is a good practice to fasten back and front shutters, so that they cannot be closed: syringing and watering as in June. Place some fresh compost loosely on the surface of the soil in the pots, if it be firm from repeated watering. Frequent surface-dressings in summer, of the compost mentioned at p. 60, are better than manure-water. Recollect that Burnett's Disinfecting Fluid, powdered charcoal, and ground coffee are deodorisers.

On the 10th and 25th lift the pots, as directed for June. The compressed earth in the pots gives vigour almost beyond belief.

Remove pear-trees to the open air to ripen their fruit (if it be intended to ripen them in the house, *abundant* ventilation is necessary), also peach and nectarine-trees (see p. 83).

Summer pinching of peach-trees cultivated as bushes to be rigidly attended to.

AUGUST.

Ventilation and watering the same as in July, syringing till the fruit begins to colour, or, if the house can be kept perfectly free from the red spider by lime and sulphur, discontinue it from the last week of July. Still pinch in laterals, and at the end pinch off the points of all the leading shoots, except figs—these will not require any further pinching.

Remove peaches, nectarines, and apricots to the hedge orchard-house, or to the open air, to retard their ripening, if required.

Summer pinching of peaches as pyramids still to be attended to. Pear-trees, if in the orchard-house, must have abundance of air night and day.

SEPTEMBER.

Ventilation as in August, unless the weather be peculiarly windy and stormy. In such weather the house may be closed: watering must be continued, but no syringing.

When peaches and nectarines are ripening, some care is required in watering; the earth must not be saturated, but only enough given to keep the foliage from flagging or drooping.

Late peaches or nectarines should be placed in a part of the house separate from the early varieties; they require syringing a fortnight, or even longer, after the early kinds.

OCTOBER.

Ventilation and watering as in September. About the middle of the month, every tree—except late peaches with their fruit still on them—should be lifted, and all roots cut off close to the bottom of the pot; and about the 24th, top-dressing must be done (this is described in p. 59), and a gallon of water given to each tree. They may now be placed close together, so as to give room for other plants, particularly chrysanthemums, which bloom well in the orchard-house all the autumn. Prune vines in pots (see p. 118). On no account remove peach, nectarine, and apricot-trees to the open air in autumn to 'harden their shoots,' as some gardeners say—as if a moist cool climate would ripen the shoots better than the warm dry air of the house. They should remain in the orchard-house all the year, except, of course, such trees as are placed out of doors to retard their fruit. These should be returned to the house, if possible, before the heavy autumnal rains come on, which saturate the roots, and do infinite mischief to the trees. Plant hyacinths and other spring-flowering bulbs in groups, marking the sites so that the pots are not placed over them in spring: also in large pots, see p. 36.

NOVEMBER.

Ventilation the same as in October. On the 5th give each tree a gallon of water, the last for the year, as the soil seldom or never becomes dry in winter. The autumnal top-dressing and watering encourage the emission of young roots; so that the tree is prepared for its fruit-bearing work early in spring. If the brown aphis makes its appearance on the young shoots and buds, use Gishurst Compound as directed below.

DECEMBER.

The house may now be shut up day and night. Some dry hay or litter should be placed among and on the pots to six inches above the surface; this will keep the roots from injury by frost, and keep the earth in the pots moist.

Paint or syringe the trees with Gishurst Compound, four ounces to a gallon of soft warm water, mixed forty-eight hours before being used. This will destroy the brown aphis, which so often infests the shoots of peach-trees in winter. Two hours afterwards syringe the trees thoroughly with pure water.

If a heavy fall of snow takes place, it should be removed from the roof, or it may break through the glass.

CONCLUSION.

I APPEAR, in the foregoing pages, to have employed a great number of words in the endeavour to make plain this simple, agreeable, and novel mode of cultivating fruit-trees. Judging from my own feelings, its advantages and pleasures are manifold. Each bud, leaf, and blossom is brought close under the eye of the cultivator. All the minute and beautiful operations of Nature can be closely watched in a genial climate. The silvery covering of the peach's blossom-bud—the beauty of its fully developed flowers (how fresh and happy they always look!)—the anthers shedding their pollen—the germs gently swelling—the downy, ruddy, luscious-looking coat of its charming fruit, are all calculated to give pleasure to the healthful cheerful mind; for the varied works of Nature's laboratory are brought near to the eye, near to the mind, near to the heart, which is instinctively lifted in thankfulness to the Giver of all such good and beautiful things!

APPENDIX.

I.

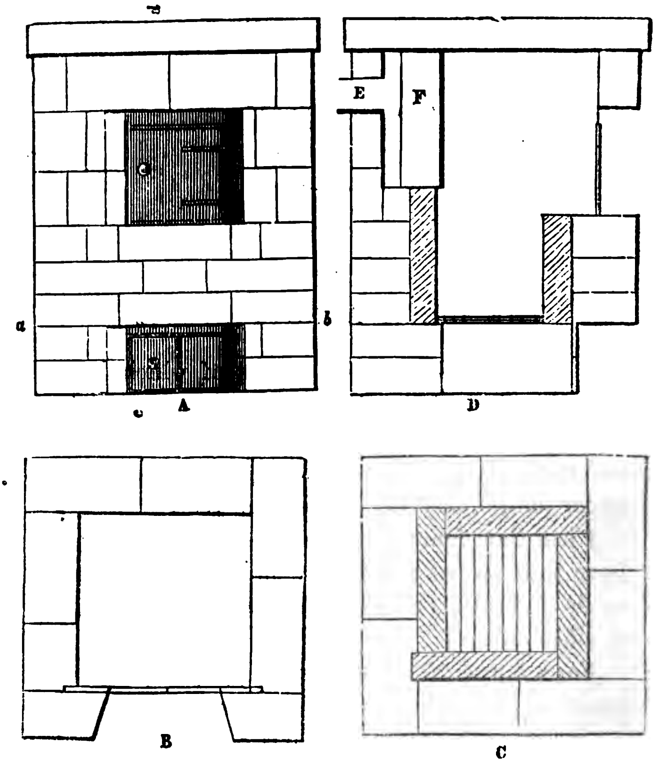
THE BRICK ARNOTT STOVE.

THE following figures, the blocks of which have been kindly lent me by the editor, appeared in the 'Gardener's Chronicle' for January 24, 1846, and a description of them was given in the same paper for January 17, in the same year.

I had then four of these stoves in operation; I have now twelve; and have never yet seen any mode of heating small or moderate-sized houses so efficient.

For a house 20 to 30 feet long, by 12, a stove 2 feet 4 inches square (outside measure), and 3 feet 10 inches high, and the fire-box 8 inches over and 8 inches deep, will be amply sufficient. For a house 40 feet long by 12, one of them 2 feet 10 inches in diameter and 3 feet 10 inches high, the fire-box 10 inches over and 10 inches deep, will also answer well. The stove should be placed in the centre of the house, within a foot or eighteen inches of

Fig. 16.



A Front elevation. B Ground plan. C Horizontal section through *a b* in A, showing the fire-bars or grating. D Vertical section through *c d* in A, showing the front and back fire-lumps, the former reduced to nine inches in depth. E Iron pipe leading to the chimney. F Fire-lump, placed an inch and a half from the mouth of the pipe leading to the chimney, and about the same distance from each end; this causes the smoke to pass round, thus preventing a too rapid consumption of the fuel. The courses of bricks in height are laid flat.

the back wall, and the horizontal pipe* go at once into a chimney outside; or, what is better, the chimney may be built inside, and carried out of the back wall, just under the glass. By this method no heat is lost. If it be thought necessary to have the feeding-door and draught-door outside, the draught-pipe must be reversed. I, however, prefer the doors inside, for the cold damp air of the house, floating near the ground-floor, is sucked in and heated. No inconvenience is experienced from dust, as every morning, before the stove is cleaned out, a pint of water or so is poured in at the feeding-door, so as to saturate the ashes before they are drawn out. Coke from the gasworks or Welsh coal is the only proper fuel to use. These stoves should be built with 4-inch brickwork and mortar, at the fire-boxes with fire-bricks and fire-clay; and they should not be used till two or three weeks after building, or the brickwork is apt to crack. I find nothing like iron for the roof or top of the stove, as Welsh tiles are apt to crack. A plate of cast-iron, nearly three-quarters of an inch thick, is necessary. On this should be placed a covering of sand 6 inches thick, and on the sand a shallow pan of galvanised iron, 2 inches deep and 2 feet square, filled with water; this will always keep up a genial moisture in the house. Flowers of sulphur should always float on the surface of the water; half a pound placed on it once a fortnight will be enough, as it gradually subsides on saturation. The water in the pan will often require replenishing. A damper should always be placed in the chimney of an Arnott stove to regulate the draught, and a side-door in the chimney will be found very convenient for sweeping.

---

* These stoves will not burn well with a long horizontal draught or flue: 3 feet must be the extreme length.

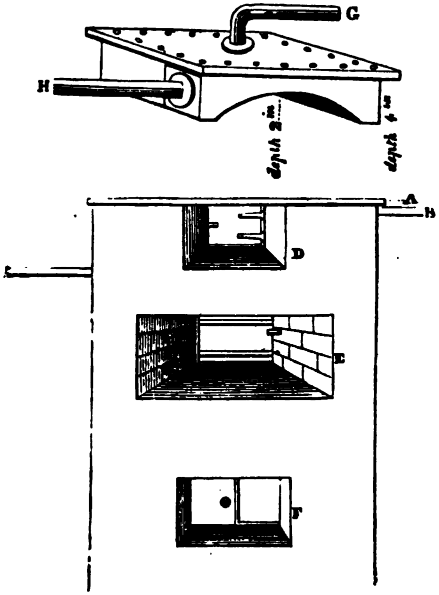
II.

THE ARNOTT STOVE BOILER.

This hot-water apparatus, which was figured in the 'Gardener's Chronicle' for May 12, 1849, and the blocks of which have been kindly lent to me by the editor, is perhaps the most economical and efficient ever introduced; it is merely a boiler placed over the fire-box of a brick Arnott stove, which does its duty most admirably, at a less cost for fitting-up and fuel than any boiler I have yet seen in operation. I must, however, state that the brick Arnott stove is not a necessary adjunct; the boiler may be fixed in 'set,' after the fashion of a brewing copper, more economically. I mention this because country bricklayers do not always understand building the brick Arnott stove.

I have now ten in full work. They have been hitherto cast of three sizes—14-inch, 16-inch, and 18-inch. One of 14 inches (14 inches square), which holds just eight quarts of water, is now heating an orchard-house 40 feet by 12; it does this well at a very small cost for fuel (coke). Another 16-inch boiler heats two propagating pits with gutters, each 60 feet long by 6 feet, also most efficiently; and another heats a propagating pit 60 feet long by 6 feet. These two last-men-

FIG. 17.



A Iron plate. B Flow-pipe. C Return-pipe. D Door over the boiler. E Feeding-door. F Ash-pit or draught-door. G Flow-pipe. H Return-pipe.*

---

* The flow- and return-pipes were originally 2-inch; they are now made 3- and 4-inch, and are found to do better.

tioned boilers have superseded others which cost four times the amount to 'set,' and devoured four times the quantity of fuel required by the above very simple form of boiler. When used for heating houses, the feeding- and draught-doors may be outside, although I do not adopt this plan; but the stove should be, if possible, inside, as the dry gentle heat of the stove and the moist heat from tanks or gutters form a perfect combination. These boilers are made by Mr. Hughes, of the Iron Foundry, Bishop's Stortford, at a charge of from 30*s.* to 35*s.* each.

III.

THE RATIONALE OF ORCHARD-HOUSE CULTURE.

(From an article by the Author in the 'Cottage Gardener,' No. 587, pp. 189, 190.)

I DO not think the rationale of the culture of orchard-house trees in pots has yet been given, or perhaps thought of. I am, therefore, tempted to break into the subject; and I hope to show that this description of culture, although at first much ridiculed by some gardeners, is quite in accordance with garden physiology.

A fruit-tree four or five years old planted in, say, November 1859, will in November 1860 be found in most cases full of blossom-buds, and its roots a mass of spongioles or feeders. In November 1861, if undisturbed, it will have fewer blossom-buds and more young shoots; and a great portion of the fibrous roots or spongioles around the root-stem, which last year were so abundant, will be dead. The rootlets, or small roots, will be found making their way from the stem of the tree; each rootlet having its fringe of spongioles taking up food farther from home only because they have exhausted the mass of earth round the stem of the newly-planted tree. And so, year after year, it sends out from the extremities of its roots fresh feeders. If the tree be delicate in its habit, like many of our esteemed kinds of fruit-trees, the feeders soon get beyond the influence of the sun, take up cold watery sap, and it becomes diseased and unfruitful.

Let me now give another side of this true picture, premising that all I write is from experience gathered from 'year to year,' and, however dull, still necessary to illustrate my orchard-house culture.

Let us, therefore, again plant a tree four or five years old in November 1859; and, instead of allowing it to remain undisturbed, take it up with all its fibres in November 1860, and replant it with a small quantity of fresh compost. In November 1861 let us again take it up. As far as my experience has yet gone, a portion of the spongioles produced in 1860 will be found decayed, but a fresh crop, induced by the removal and the fresh compost, will have sprung forth; so that the roots of the tree are still a mass of fibres or spongioles, and its branches with short annual shoots on them full of blossom-buds; and so from 'year to year,' if the tree be removed annually, the roots will always be young, near home, and easily fed.

The fruit-garden may be thus completely under control. If small fruit-trees are wanted, remove them annually; if larger but still very fruitful trees are required, remove them biennially. If large trees are wished for, to be kept within bounds by the pruning-knife only, remove not at all, neither root-prune, but allow your trees to grow vigorously; and if in a highly favourable soil and climate, they will, in the course of years, bear large quantities of fruit.

We now come to trees in pots. I have just examined one of my trees in a 13-inch pot, in which it has been, without shifting, seven years. It was top-dressed (as it has been annually) in October 1858, by taking out the earth about halfway down the pot from the surface, and replacing it with fresh compost, ramming it down with great firmness. The compost just removed seems to be quite exhausted, for every part of it is permeated with small fibrous roots, the greater portion of which seem to be dead or dying; so I now take it out with its mass of spongioles which have done their work, and replace it with some fresh compost, leaving a circular mass of rootlets all round the root-stem* of the tree untouched. These rootlets (if the tree be top-dressed in October) will immediately commence to put forth feeders; so that in October 1860 the compost will be again found to be thoroughly exhausted. It will thus, I trust, be seen that the spongioles, or principal feeders, near the root-stems, are but temporary in trees planted in the open ground; but may be made annual, to a certain extent, by the annual removal of the tree.

By cultivating the tree in a pot, and removing it, you *force* the rootlets to be annual; and the tree, being thus supplied annually with fresh feeders and fresh food, becomes healthy, fruitful, and vigorous. It has not to ramble for its food, and therefore may be likened in its comfortable state to a plump Devon ox in a Devonshire pasture; while a fruit-tree uncared for is something like a wild buffalo in a barren country.

The vine-dressers in some parts of the south of Europe seem to have for a long time known that the fibrous roots of the vine are annual; for they take away the earth from their vine-stocks in winter, with all the exhausted spongioles of the preceding season, let it lie in a ridge between the rows till spring, and then replace it with some manure. The root-stem promptly puts forth its feeders, and the grapes are thus brought to high perfection. I remember perfectly well seeing the operation of taking away the soil from the vines, and, not knowing the 'reason why,' feeling much surprise at what appeared to me so barbarous a custom.

---

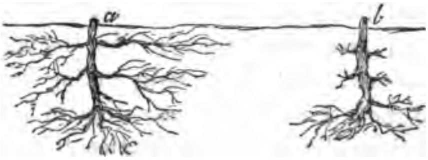
* That part of the tree whence the roots proceed.

To return to orchard-house trees. There is nothing in gardening to be compared to their culture when the rationale of it is fully understood. Not only is there an annual crop of feeding-roots from above, but from below also. I have before me a stout tree seven years old taken from its pot, and find three or four large roots coiled round the bottom part of the ball of earth and fibrous roots. From these annually are put forth numerous spongioles, which make their way through the holes at the bottom of the pot. If left undisturbed, some of these become roots of considerable size, and by making their way too deeply into the border draw up too much food, giving such vigorous growth as to make the tree unfruitful. I now, therefore, have the trees lifted twice in June and twice in July, the first and the last week in each month. This prevents the roots going deeply into the border, and induces a host of spongioles to push forth, spreading themselves under the pot and on the surface of the border. If orchard-house trees be planted in the borders instead of being kept in pots, the necessity of annual removal and giving fresh compost to the roots, equivalent to the annual top-dressing given to potted trees, will be at once apparent.

With orchard-houses, either lean-to or span-roofed, properly ventilated at the sides, ventilation freely given, and regular syringing, no failure can take place. All kinds of fruits can be cultivated in them; and when one sees, as I often have, the fine crop of pears, plums, peaches, &c., grown on well-fed little trees, no surprise will be felt at the enormous extent this kind of culture has now arrived at.

P.S.—The following letter I received from an American friend, which, bearing as it does on annual root-pruning, seems of much interest. He was deputed, by the United States Government, to travel to Europe to look into the details of vine-culture. The following extract alludes to the subject:—'I have your letter on a matter which interested me greatly last winter while in Zante and Cephalonia, where I found they not

FIG. 18.

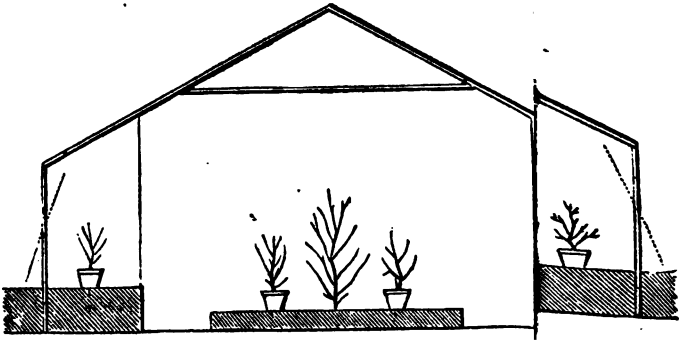


a Roots of Zante vine, unpruned. *b* Roots of Zante vine, as pruned and exposed during the winter.

only took away the earth from the vines, from nine to twelve inches in depth, but also cut off all the roots within six inches of the surface close to the stem. These stumps of roots will, of course, throw out plenty of feeders into the earth, which is drawn around them again after being fertilised by exposure to the atmosphere, and by the usual quantum of stable-manure spread over and mixed with it. Now, if the practice of the Greeks with the Zante currant is in accordance with sound physiological principles, I can save at least 500 dollars an acre in the formation of my vineyard, by dispensing with the deep rich soil, having depth only for drainage, and putting my manure annually near the surface, to feed the spongioles formed annually.'

It will be seen, from this extract, that what has been considered here a new doctrine and practice—viz., that of annually taking away the surface roots of orchard-house trees in pots, and giving them fresh food, a practice the result of pure accident—is very ancient, and has, probably, been followed by the Greek vine-dressers from time immemorial.

e 193.



Transverse Section

IV.

THE ORCHARD-HOUSE OF THOMAS BEWLEY, ESQ.

AT BLACKROCK, DUBLIN.

(*Extracted from the 'Quarterly Review' for October* 1859.)

'I AM more than ever convinced of the superiority of fruit-houses, especially in this island (Ireland), over walls. I have adopted the opinion that glass and timber are cheaper than brick and stone; that is to say, that a given quantity of the superior fruits can be produced in a fruit-house costing a less sum than walls producing the same quantity, even without taking into consideration the much greater certainty of crops from the trees being protected, but assuming the walls to give fair average crops. My new house is all timber and glass, with a triple span-roof, 84 feet long and 60 wide, the centre span 1½ foot higher than the two side ones. In this centre division is a bed 19 feet wide, and here I have planted my pyramidal pears,* most of which are now 10 feet high, splendid trees, and full of bloom. They are 6 feet apart. Altogether there are 16 of these in the house, and about 100 peach, nectarine, plum, and apricot trees. The effect is very beautiful, all being now in bloom; some of the pears are magnificent. The sides of the houses are glazed down to the ground, the sashes being hung on central pivots, and all readily opened. I have more light than I ever saw in any other house, and the ventilation appears all I could wish; and these I take to be two cardinal points for producing good fruit. I propose to grow vines to all the pillars inside; strawberries in the side borders; and I know not what else I may try, for I have still much room to spare. I am keeping an account of the temperature, to compare with that of the open air. In February the mean height was 3° above the outside, and in March 5½°; and it will doubtless be greater during summer and autumn. One reason that induced me to erect so large a structure was an almost uniform want of success with the pears; for although I took great care in protecting them when in bloom, yet late frosts almost always caused the fruit to drop, so that scarcely one tree in ten gave a fair crop. My house is handsome and well-finished—indeed rather too well, for it has cost me about 500*l.* There is a good deal of extra work which might be saved, and I have little doubt the same-sized building might be erected for 1*s.* 9*d.* per foot square of ground covered.

---

* Mr. B. (in January 1862) writes: 'You have proved a true prophet: the pears did not give good fruit, so I have removed them and replaced them with peaches and nectarines, which succeed admirably.'

In a recent communication from Mr. Bewley, he says: 'I often see, or fancy I see, a very close analogy between animals and plants. Now, the harder *we* work by day, the more thorough is the rest we require by night; and is it not so with plants? So I say, give plenty of air by night to the orchard-house trees, to allow them to *rest* in a low temperature; and, having rested, work them hard by day, by diminished air and consequently higher temperature. I believe few are aware how much heat plants will bear in broad daylight, if they be allowed perfect rest at night.

'Surely it is the close warm damp atmosphere at night that draws our plants, not heat by day; we meet with no such thing in nature analogous to our houses at night, as they are usually treated. Out of doors the air is always in motion—radiation must cause it to be so.

'I do not think 90° to 100° of heat would injure my trees on a sunny day; and our practice is to give plenty of air all night, to syringe early, and, as the sun gets somewhat high, and the excess of moisture evaporated, to reduce the air until the house gets hot, and to keep it so all day, thus taking advantage of bright days to push on our fruits—in fact, to "make hay while the sun shines." When somewhat cool we syringe again, and open every light. This is my plan for obtaining good wood and high-flavoured fruit. And is it not as near an approach to nature as possible?

'I annex a comparative statement of the temperature, from February to September inclusive, of the external air and in my orchard-house, by

	Outside Temperature	Inside Temperature
	Degrees	Degrees
February	43·62	47·35
March	46·03	50·43
April	45·61	50·75
May	50·84	59·30
June	58·05	64·71
July	64·38	68·82
August	60·45	64·30
September	55·66	60·30
Mean	53·08	58·24

which you will observe that during these eight months the latter has the advantage of nearly 5¼° over the former. Is not this equal to nearly five degrees of latitude?

'I must merely add, that in dull sunless weather, there is very little difference between inside and outside temperature.'

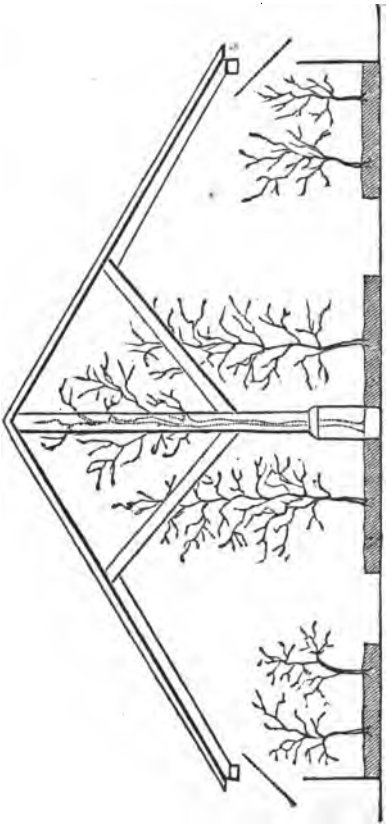
V.

THE ORCHARD-HOUSE OF DR. NEWINGTON,

AT TICEHURST, SUSSEX.

THE orchard-house of Dr. Samuel Newington, at Ticehurst, Sussex, of which fig. 20 is a sectional view, is a very useful structure. It is 80 feet

Fig. 20.



Transverse Section of Orchard-House of Dr. Samuel Newington, at Ticehurst, Sussex.

long, 30 feet wide, 15 feet high in the centre, and 5 feet at the sides. Side ventilation is effected by sashes, 3 feet by 2 feet 6 inches, swinging on pivots. It has two shutters at the apex of the roof, to let off heated air. The central border is 10 feet wide, in which were planted three rows of trees, peaches and nectarines. Those in the middle row are standards, with clear stems 6 feet in height; the side rows are half-standards, so that this border has quite an orchard-like look. The side borders are 6 feet wide; in each of these are two rows of bush-trees in pots plunged. The standards and half-standards in the centre have made most vigorous growth, and will soon be large stout trees.

I have thought it necessary to describe this house as well as that of Mr. Bewley, to let my readers see how orchard-houses may be varied in their construction, and made useful and agreeable in the smallest gardens as well as in those of the opulent. The purlins of wood in the former are clumsy: the roof should be supported with light iron pillars.

VI.

COMPOTES.

THESE delicious French open tarts are made as follows:—Take half a pound of flour, six ounces of butter, and a little pounded loaf-sugar; rub and mix thoroughly with an egg well beaten. Roll the paste into a thin crust, and then take hoops of tin about three inches in diameter and one inch deep; place your crust in these as when making a common tart (from which it differs in having upright instead of sloping sides, and no top-crust); the side and bottom crust to be of equal thickness. These tin hoops (which are bottomless), with the crust in them, should then be placed in the oven on a broad sheet of the same metal till the crust be half-baked. Stew the fruit with sugar till half-cooked, then fill the half-baked crusts in the tin hoops with it. Sprinkle pounded loaf-sugar over it, and finish baking. You will then have a tart without upper crust, full of juice and fruit, with which our English tarts will bear no comparison; for the fine aroma of strawberries, raspberries, cherries, and mirabelle plums is fully preserved. They should be taken out of the hoops as soon as cool, and eaten while fresh, as the juice soon soddens the crust.

This receipt was given to me by a French 'chef de cuisine,' and has answered admirably.

VII.

A SELECT LIST OF

FRUITS ADAPTED FOR ORCHARD-HOUSE CULTURE,

PLACED IN THE ORDER OF THEIR RIPENING.

The sorts marked thus * may be selected by those requiring only a few trees.

Apricots

- Early Sardinian
- *Oulins' Early Peach
- Large Early
- *St. Ambroise
- *Kaisha
- *Royal
- *Peach

Nectarines

- Bowden
- *Downton
- *Elruge
- *Hardwicke Seedling
- *Rivers' Orange
- *Violette Hâtive
- Pineapple
- Early Newington
- *Victoria

The Orange Tribe

- Citron
- *Egg Orange
- Lemon
- *Maltese Blood Orange
- Persian Lime
- *St. Michael's Orange
- *Silver Orange
- Shaddock
- Sweet Lemon
- Sweet Lime
- *Tangierine Orange

Peaches

- *Early Victoria
- *Early York
- *Early Albert
- *Early Grosse Mignonne
- *Précoce de Savoie

Pêche Abec
*Grosse Mignonne
*Noblesse
*Royal George
Barrington
*Walburton Admirable
Late Admirable
*Bourdin
Desse Tardive
Princess of Wales

Dessert Plums

*Early Favourite
*De Montfort
Denniston's Superb
*July Green Gage
*Transparent Gage
*Green Gage
*Jefferson
*Purple Gage
*Reine Claude de Bavay
Guthrie's Late Green
*Coe's Golden Drop
Ickworth Impératrice
*Late Black Orleans

Kitchen Plums

Early Prolific
*Early Orleans
*Kirke's
*Victoria
*Prince Englebert
Pond's Seedling
*Autumn Compote
*Belle de Septembre

Cherries

Early Purple Guigne
*Empress Eugénie
*Belle d'Orléans
*Knight's Early Black
*May Duke
*Archduke
New Royal
Duchesse de Palluau
Black Eagle
*Elton
Bigarreau Napoléon
Bigarreau
*Reine Hortense
*Florence
*Late Duke
Belle Magnifique
Morello

Figs

Early Violet
White Marseilles
Brown Turkey
White Ischia (for forcing)

Pears

*Doyenné d'Été
*Jargonelle
Seckle
*Colmar d'Été
Louis Bonne
Gansel's Bergamot
*Beurré Superfin
Beurré De Caen

Crassane
Doyenné Gris
*Marie Louise
*Thompson's
Van Mons (Léon le Clerc)
*Glou Morçeau
Beurré d'Aremberg
Passe Colmar
*Winter Nelis
Easter Beurré
Beurré de Rance
*Josephine de Malines
*Bergamotte d'Espérence

Grapes (for the Common Orchard-House)

Early Black Bordeaux
*Early Malingre
Early Smyrna Frontignan
Early Auvergne Frontignan
Grove End Sweetwater
*Muscat St. Laurent
*Royal Muscadine
*White Romain
*Esperione
*Black Hamburg
Chaptal
*Muscat de Sarbelle

Grapes (for the Forcing Orchard-House)

Chasselas Musqué
*Black Frontignan
Purple Constantia
*Smyrna Frontignan
Muscat of Alexandria
*Bowood Muscat

Apples

Calville Blanche
*Newtown Pippin
*Northern Spy
*Reinette du Canada
Melon Apple
American Mother
William's Favourite

Apples for the North

*White Juneating
*Irish Peach Apple
*Cox's Orange Pippin
*Ribstone Pippin
*Golden Pippin
Golden Reinette
*Van Mons Reinette
Coe's Golden Drop
*Sturmer Pippin

Strawberries

May Queen, very early
Marguerite
*Keen's Seedling
*Seedling Eliza
La Constante
*Carolina Superba
*British Queen

INDEX.

Almonds, 134
Aphides, 167
Aphis, black, 104
Apple, 128
— sorts, 129
Apricot, 51
— as an ornamental tree, 65
— as pyramids, 66
— caterpillar, 174
— compost for, 59
— in borders, 68
— potting, 53
— pruning, 55
— retarding, 65
— sorts, 66
— summer pinching of, 55, 67
— planting out of, 68
— distance apart of, 69
April, 172
Arnott stove, 181
— boiler, 184
August, 177

Borders, 9
— mixture for, 10
Boxes, 48
Brick walls for lean-to houses, 14
Buds, leaf and fruit, 73
Bulbs in pots, 36

Camellia, 42
Chalk for composts, 50
Charcoal fires, 173
Checking growth, 89
Cherries, 103
— houses for, 105
Cherry, sorts, 104
— summer pinching of pyramids, 106
Chirimoya, 155
Clingstone peaches, 93
Chlorine, 176
Compost, 48
Compotes, receipt for making, 199
Coverings, 42
Cut-down trees, 76

December, 179
Double glazing, 141

Estimates, 11, 21, 25

February, 171
Feeding trees from above, 59
Fig, 107, 160
— in cellar, 109
— management of, 107
— sorts, 108
Flavour of peaches, &c., 45
Flowers of sulphur on water, 183
Forcing orchard-house, 134
— with root-heat, 140
Free ventilation, 81

Fruit spurs, 75

General culture, 39
Glass recommended, 7
Grape, 116
— bushes, 117
— forcing, 120
— half-standards, 127
— pruning, 118
— sorts, 120
Grapes on hot-water pipes, 121
Granadilla, 157
Guava, 157

Hotbed for potted trees, 138 *note*

Implement for top-dressing, 62
Insects, to keep off, 98
— to destroy, 166
Iron sash-bars, 22
— sockets for posts, 38

January, 171
July, 176
June, 175

Laying out orchard-house, 27
Lee-Chee, 156
Lemon, 41
Liquid Manure, 58
List of fruits, 201
Loquat, 156

Maiden trees, 53, 70
Mangaba, 159
Mango, 158
Mangosteen, 155
Marangaba, 160
March, 171
May, 173
Mulberry, 130

Nabuzeiro, 160
Nectarine, as an ornamental tree, 83. For treatment, see *Peach.*
Nectarine, sorts, 92
Netting, for ventilators, 82, 174
November, 179

October, 178
Orange, 41, 147
— black fungus, 154
— compost for, 152
— Maltese, 151
— St. Michael's, 150
— Tangierine, 148
Orange-grove, how to form, 164
— scale, 170
Orchard-house, origin of, 1
— all glass, 27
— forcing, 135
— hedge, 143
— large span-roofed, 22
— lean-to, 5
— poor man's, 4
— rationale of culture, 186
— small span-roofed, 15
— tropical, 145
Orchard-houses as sanatoriums, 35

Path, sunken, 10
Peach and nectarine, 69
— as an ornamental tree, 83
— 'en cordon oblique,' 85
— gathering the fruit, 84
— miniature trees of, 91
— pinching, 76
— planting out of pyramids, 89
— pruning, 73
— pyramidal, 84
— retarding, 83
— sorts, 92
— summer pinching of bushes, 76
— summer pinching of pyramids, 87
Pear, 110
— house, 116
— pinching of pyramids, 115
— season for gathering, 112
— sorts, 114, 115

Pinching, neglected, remedy for, 90
Plantain, dwarf, 158
Plum, 96
— house, 98
— sorts, 97, 101
— summer pinching of pyramids and bushes, 102
Pomegranate, 156
Portable orchard-houses, 38
Pots, 47
Potting, 50

Quassia-water, 167

Rainwater for syringing, 35
Rationale of culture, 186
Red spider, 81, 168
Removing trees to open air, 47
Rose apple, 158

Sapodilla, 159
September, 177
Shoots, shrivelling of, 62
Solid surface for peach-trees, 31
Standard peaches, 27
— peach-trees, 31
— peach-tree culture, 32
Strawberry, 130
— compost, 131
— potting, 131
— sorts, 131
Succession houses, 13
Sulphur and lime, 169
Surface compost, 60
Sweet lime, 159
Syrian nectarines, 95
Syringing, 169, 173

Thinning fruit, 58
Tiffany, 172
Tobacco smoke, 167
Top-dressing, 59
Trees, feeding from above, 61
— implement for dressing, 62
— number wanted, 20 *note*

Ventilators, 18
— netting for, 82, 174

Water, 43, 80

Year, 1st, 55
— 2nd, 56

Zante, vine culture in, 191

LONDON
PRINTED BY SPOTTISWOODE AND CO.
NEW-STREET SQUARE

THE following Works by MR. RIVERS are sold by MESSRS. LONGMANS and CO. or sent post-free from the Author at the prices quoted:—

THE 'ROSE-AMATEUR'S GUIDE.'

Containing the History and Description of the finer kinds of Roses, with ample Directions for their Cultivation in the Open Air and in Pots. *Eighth Edition*, just published, 4*s*.

THE ORCHARD-HOUSE:

Or, The Cultivation of Fruit-Trees in Pots under Glass. *Twelfth Edition*, just published, 3*s*. 6*d*.

THE MINIATURE FRUIT GARDEN:

Or, The Culture of Fruit Trees as Pyramids and Bushes. *Twelfth Edition*, 3*s*.

A DESCRIPTIVE CATALOGUE OF FRUITS,

for six stamps, or free to customers.